Consumer Reports

"FACTS YOU NEED BEFORE YOU BU

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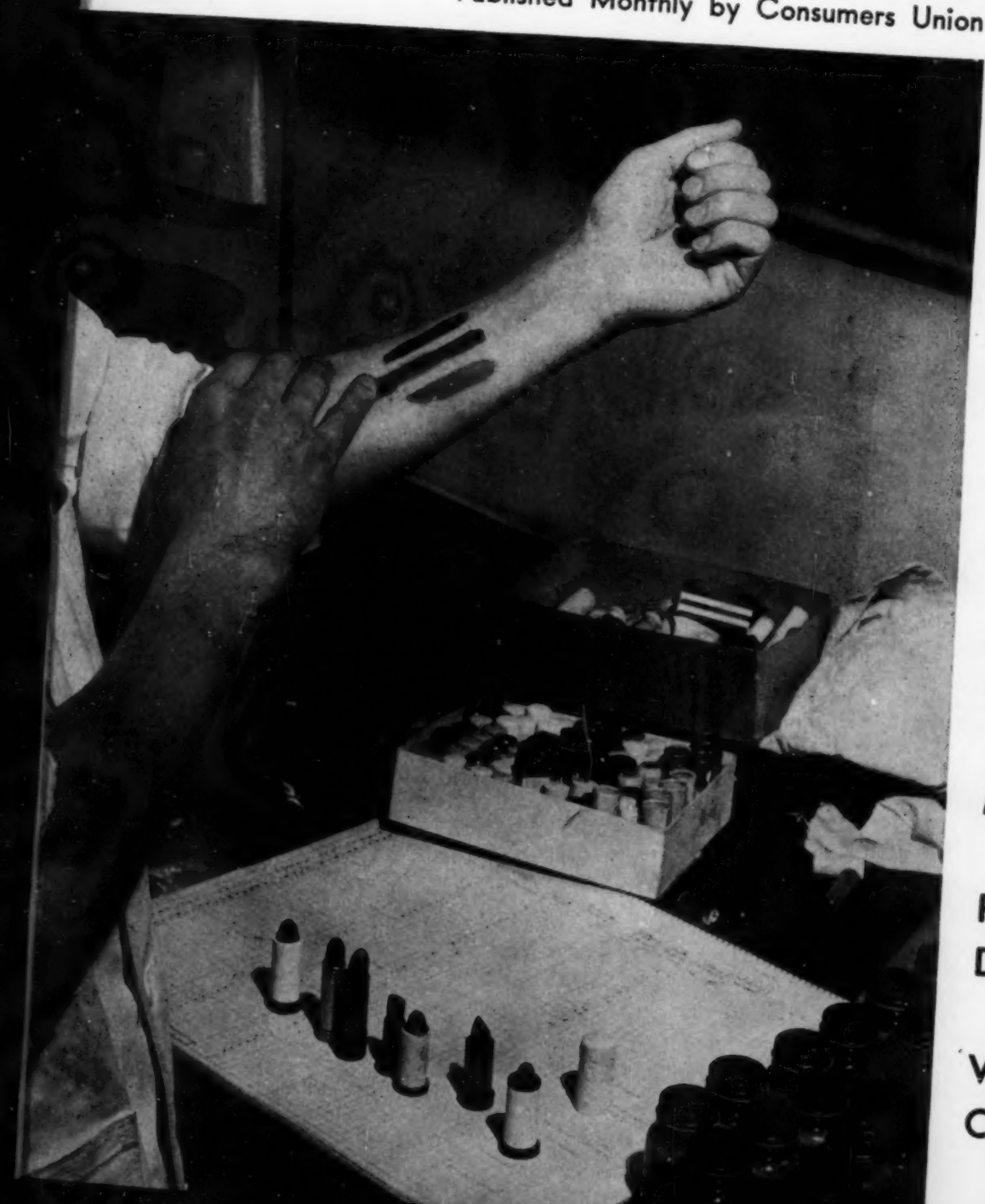

LIPSTICKS

AUTO CARE

INSURANCE

FABRIC DYES

HOME HEATING

CANNED PEACHES

MEDICAL CARE

FLUORINE & DENTAL CARIES

WINDOW CLEANERS

Where Are the Reports on Postwar Products?

That, in a nutshell, is what hundreds of CU members are writing in to ask. And the only answer CU can give them is that they will have to be patient. It is CU's rule to buy its samples for test from retail stores and not from manufacturers. That is the only way we can be sure of getting just what the ordinary buyer gets and not specially selected samples. And for the same reason that consumers have not been able to buy refrigerators, radios, etc., CU has not been able to buy them—or at least not many of them. As this issue goes to press, four electric refrigerators are on the way to the laboratory of a consultant to be tested, and our shoppers have just brought one radio* into CU's electrical laboratory. And we expect that from now on the refrigerators, washing machines, radios, vacuum cleaners, etc. etc., will be coming into the laboratories of CU and its consultants in an increasing stream.

But at that point we must warn impatient members that they can't expect reports on these products overnight. Some of the tests take many weeks to run, and a report based on incomplete tests might turn out to be seriously misleading. Where preliminary reports can be made with reasonable assurance of accuracy, CU will make them at the earliest possible moment.

And please, please, dear members, don't write in for advance information on tests, because it is impossible to give advance information. As soon as the test reports have been prepared and thoroughly checked they are published. If CU engineers were to take time out from the laboratory work to answer inquiries for advance information, the tests would never get done.

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* A preliminary report with reasonable assurance of accuracy: Emerson table model radio (model 507)—a fairly good radio at the OPA price of $20. Much better than three radios reported on in October Reports.

Where Is the Buying Guide?

The December issue of Consumer Reports—the special Annual Buying Guide issue—has not yet been mailed to members. We had hoped that the end of the war would end the log-jam in the book printing and binding industry, and that it would be possible to get the 1946 Buying Guide out on schedule this year. We are, however, still waiting, with the hope that the completion of the binding is not too far off. Copies will be mailed to members the moment they are available.

CONSUMERS UNION is a non-profit organization chartered under the Membership Corporation Laws of New York State. Its purpose is to furnish unbiased, usable information to help families meet their buying problems, get their money's worth in their purchases, develop and maintain an understanding of the forces affecting their interests as consumers. Consumers Union has no connection with any commercial interest and accepts no advertising; income is derived from the fees of members, each of whom has the right to vote for candidates to the Board of Directors. More than 70 educators, social workers and scientists sponsor Consumers Union and a national advisory committee of consumer leaders contributes to the formulation of policy (names of the members of the committee will be furnished on request).

CONSUMER REPORTS each month gives comparative ratings of a variety of products based on tests and expert examinations, together with general buying guidance, information on medical and health questions, and news of happenings affecting the consumer's interests. The Reports is the manual of informed and efficient consumers the country over.

THE BUYING GUIDE (published as the December issue of the Reports) each year brings together information from all the preceding issues with new material and special buying advice. Pocket-size, 384 pages, with ratings of several thousand products, the Buying Guide is an invaluable shopping companion. Every member gets a copy of the Guide with his membership.

BREAD & BUTTER reports each week on new and predicted price and quality changes in consumer goods, interprets Washington legislation as it affects consumers, reports government regulations and actions on the consumer front, advises on food buying and preparation.

SUBSCRIPTION FEES are $4 a year, which includes subscription to the Reports and Buying Guide and Bread & Butter; $3.50 without Bread & Butter (for foreign and Canadian memberships add 50¢). Reduced subscription rates are available for groups of 5 or more (write for details). Library rates, for the Reports and Bread & Butter without the Buying Guide issue, are $3.50; for the Reports alone, $3.

Membership involves no obligation whatsoever on the part of the member beyond the payment of the subscription fee.

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A Letter to Mr. Jones

Dear Mr. Jones,

When you joined CU several years ago, you wrote us that you were tired of being played for a sucker by high-pressure salesmen; you said you were finally doing something about it: joining CU. We were happy to learn from your later letters, when you renewed your membership, that by buying Brands A, B and C instead of brands X, Y and Z, you had saved lots of money. But when you say in your last letter that you now consider yourself a smart consumer, we beg to differ.

A smart consumer would not have been content, as you apparently were, to save a dollar by buying Brand A instead of Brand X, while doing nothing to keep the price of both from going up two dollars. A smart consumer, Mr. Jones, would not have kept still while unscrupulous producers and sellers took advantage of the war emergency to grab an unearned slice out of every dollar he spent. He would not have allowed Congress to look the other way while the looting was going on.

You are probably wondering why we fuss about this now, with the war over, and scarce goods coming back on the market. We're fussing, because in 1946, if you're not smart, you are going to be taken for a ride.

Did you read that when OPA removed controls on citrus fruits, a few weeks ago, prices in some markets doubled overnight? Did you hear about the plans of the building owners in your town to raise rents by 50% as soon as controls are removed?

Powerful groups, such as the National Association of Manufacturers, are fighting for the quick end of all controls. So are all the get-rich-quick speculators who hope to make one final, grand clean-up at your expense, in the wild splurge of a boom-and-bust cycle.

Wartime restraints that kept them and compliant members of Congress in partial check have been weakened. If they do succeed in removing all controls while shortages are still severe and money more than plentiful, you and all other consumers, Mr. Jones, are going to be taken for an inflationary joy-ride that can end only in a grand smashup. Maybe you'd have a job or a business and a decent income when it was over, and maybe you wouldn't—for if it happens, some ten or fifteen million Americans will be jobless, and broke.

The reason we're writing you, Mr. Jones, is that you can help prevent this smashup. The President, at least in words, has supported the anti-inflationary forces. Consumers have, in recent months, found a staunch friend in Chester Bowles, head of OPA. And there is a large group of Congressmen on your side.

A smart consumer, Mr. Jones, will let these people know he is with them in the fight against inflation. They'll fight harder if he does that; and Administration words might become Administration deeds. A smart consumer will follow the legislative battles on bills affecting his interests, and write letters to the chairmen of committees holding hearings on these bills. He will keep after the wavering members of Congress (if they are among his representatives).

A smart consumer will stir up every organization of which he is a member, to take an active part in the anti-inflation fight. He will join CU's "Letter Writing Brigade" (see *Bread & Butter*) and organize his friends for active battle. The stakes are high, Mr. Jones; you can't afford to lose.

Yours for a winning fight,
CONSUMERS UNION

Consumer Reports

"FACTS YOU NEED BEFORE YOU BUY"

"Because it was established for the very purpose of aiding families to buy wisely, to avoid waste and to maintain health and living standards, and because it is the largest technical organization providing such guidance, Consumers Union recognizes a special responsibility to the nation. In full awareness of that responsibility, we pledge ourselves to do everything in our power to help Americans as consumers make the greatest possible contribution to the national need."—FROM A RESOLUTION ADOPTED ON DECEMBER 10, 1941, BY THE DIRECTORS.

VOL. 11, NO. 1 • JANUARY 1946

TECHNICAL SECTION

Lipsticks: Popular Brands Rated for Adherence, Consistency and Ease of Application 4

Expert Advice on the Care of Your Car in Winter 7

Ratings of Dyes with Suggestions on Home Dyeing 9

Liquid Window Cleaners: 10 Popular Brands Pass CU's Tests 11

Canned Peaches: 29 Brands Tested and Graded for CU by U. S. Government Graders 12

Buying Heating Equipment: CU's Consultant Gives Advice on Boilers, Furnaces and Stokers 14

MEDICAL SECTION

Can the Addition of Fluorine to Water Arrest Dental Caries? Discussion of an Experiment Now in Progress 21

NEWS AND INFORMATION

Life Insurance: The "Best Buy"—by E. A. Gilbert 24

Medical Care for All: The Wagner-Murray-Dingell Plan—by Dr. Ernst Boas 26

Cumulative Index 27

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REPORTS ON PRODUCTS

Ratings of products represent the best judgment of staff technicians or of consultants in university, governmental and private laboratories. Samples for test are in practically all cases obtained on the open market by CU's shoppers. Ratings are based on laboratory tests, carefully controlled use tests, the opinion of qualified authorities, the experience of a large number of persons, or on a combination of these factors. Even with rigorous tests, interpretation of findings is a matter on which expert opinion often differs. It is Consumers Union's pledge that opinions entering into its evaluations shall be as free from bias as it is possible to make them.

Lipstick

A CU cosmetic expert rates 27 brands for adherence, consistency and ease of application

What do you look for in a lipstick? Probably you have learned to discount automatically the extravagant claims of almost mystical powers made for lipsticks by the overwrought imaginations of the advertising copy writers, and go about the business of buying lipstick in a reasonably sane fashion.

True, color and perfume are entirely matters of personal choice, but certain important factors can be tested, and the results can serve as a helpful aid in guiding your selection.

Ease of application, consistency and adherence are the three properties considered most important by experts. And the best lipstick, these experts agree, has good adherence, is of medium consistency (not too dry or too greasy), may be applied satisfactorily (not too hard or too soft) and has good perfume of medium strength.

In testing an average of four colors of each of 27 popular brands of lipstick, CU found that uniformity of the three major factors is very rare, even among different colors of the same brand. Of the 27 brands tested, only seven—*Tangee, Dorothy Gray, Photo Finish, Max Factor, Yardley, Revlon* and *Daggett & Ramsdell*—were uniform from color to color in the three factors.

Results show that a few brands have switched positions from the "Acceptable" to the "Not Acceptable" list and vice versa in the three years since CU's last tests (see *Reports*, August, 1942). *Louis Philippe* and *Kissproof* have been demoted, and *Elizabeth Post, Elizabeth Arden* and *Harriet Hubbard Ayer* now make the "Acceptable" grade.

WHAT TO LOOK FOR

ADHERENCE: The color may be just right and the perfume to your taste, but if the lipstick doesn't have much "staying power," and requires frequent repair jobs, it's not a very good buy.

EASE OF APPLICATION: If the lipstick is too hard or too soft, too greasy or too dry for proper application, it won't look good and you are wasting your money on it.

CONSISTENCY: A happy medium — fairly hard and medium greasy—is the desirable combination. Any extremes in these qualities are bad, but a lipstick which combines greasiness with softness is considered least satisfactory since smeary application and "bleeding" along the edges of the lips result. (Variable consistency within certain brands may be caused by differences in pigment content or by age. A stick a year old may feel quite different from a new one.)

SOFTENING POINT: The softening point of a lipstick is an indication of its year-round usability. Too low a softening point (i.e. if it softens at a low temperature) means you won't be able to use your lipstick on a hot Summer day. On the other hand, a lipstick that remains hard at high temperatures tends to crumble.

PERFUME: Besides acting as a lure to the lipstick shopper, the perfume acts as a mask to cover the odors of the oils and waxes used in making the lipstick. Not all brands were successful in this respect: *Elizabeth Post* and *Elizabeth Kent*, for example, had a faint castor-oil odor which is apt to get stronger as the lipstick gets older.

CONTAINERS: CU did not evaluate the convenience and sturdiness of containers at this time. Since V-J Day, lipstick manufacturers have been reconverting from cardboard, wood and plastic containers (most of which were unsatisfactory) to metal containers. If you have been annoyed by the appearance of "sweating" on your lipstick (oil beads forming on the surface of the stick) you can look forward to its disappearance as the new containers come back. Such sweating was usually the fault of the wartime "ersatz" containers; and in any event, although sweating makes a lipstick look messy, it has no effect on its usefulness.

STAINING: You don't want a lipstick which has good "staying power" on your lips to exhibit the same tenacity on your towels, napkins and pillowcases. Most of the brands tested left either no stain or a very faint stain on cotton after it was washed in hot, soapy water under standard conditions. Washing stains out of rayon was not so successful, since rayon should not be laundered in very hot water or with strong soaps.

COLOR: This is where lipstick manufacturers have a field day, bombarding the public with a never-ending succession of elaborate advertising campaigns introducing a succession of "new" colors with high-powered names and the "ne plus ultra" in whatever it is a woman wants her lipstick to do for her. Despite the variety of names, most lipsticks fall into eight color classifications: orange-red; medium red—orange cast; true red; medium red—blue cast; light blue-red; dark blue-red; fuchsia; dark, with brown or purple cast. More often than not, the commercial name will furnish no hint at all of the lipstick's color. For example, lipsticks labelled "Medium" or "Medium-Red" fell into a wide range of color categories, including orange-red, true red, deep brown-purple red or a nondescript dark, muddy shade. However, if you pick a color with "pink" in the name, you are quite likely to get a lipstick with a fuchsia tone. (While choice of colors is a matter of personal taste, CU ratings include notes on the quality of the colors tested.)

Note: Rare cases of irritation caused by lipstick may be due to the perfume or to excess bromo acid content in the lipstick. Whatever the source, any lipstick which causes irritation should be discarded immediately and another brand should be substituted for it.

HOW CU TESTED

Three to five colors (in most brands, four) of 27 brands of lipstick were examined for odor (quality and strength), color, ease of application, consistency, adherence, softening point, sweating and staining on cotton. Odor, color, consistency and adherence were not measured by laboratory tests, but were evaluated by experts.

To determine the staining capacity of the brands tested, CU's technicians made smears on white cotton fabric, allowed them to set, and then washed the fabric in hot, soapy water. Those brands and colors which caused permanent stains are noted in the ratings.

Softening points of the samples were determined by heating the lipsticks slowly in a water bath and noting the temperature at which standard weights embedded in the lipsticks dropped off.

Lipstick Color Chart

The descriptions below refer to the numbers following each color name in the ratings. To help buyers select the best lipsticks in a given color, the brands of each color which CU's cosmetic consultant rated "Excellent" are listed below each color description. For fuller descriptions of thse lipsticks, refer to the ratings.

1—Orange-red
Lentheric, Medium
Tangee, Theatrical

2—Medium red with orange cast
Chen Yu, Flame Swept Red
Dorothy Gray, Daredevil
Elizabeth Arden, Montezuma Red
Louis Philippe Angelus, Light. Formal Red
Max Factor, Vivid Red

3—True red (orange and blue well balanced)
Harriet Hubbard Ayer, Navy Red
Revlon, Amou Red
DuBarry, Emblem Red
Tangee, Medium Red

4—Medium red with blue cast
Tangee, Red-Red

5—Light blue-red
Dorothy Gray, Crimson Glory

6—Dark blue-red
Dorothy Gray, Red Letter

7—Fuchsia (see comments for different hues)
Elizabeth Arden, Ruby
Revlon, Bright Forecast, Chilibean
DuBarry, Red Violet

8—Other shades, generally purple-brown (see comments for descriptions)
Dorothy Gray, Nut Brown Red
Max Factor, Natural Red, Medium Red, Deep Red
Revlon, Cherry Coke

ACCEPTABLE

In estimated order of over-all quality of each brand. Prices in parentheses represent cost per gram. Italicized words are the labeled colors; figures which follow them refer to their description in the color chart on this page. Unless otherwise stated, comments in a rating refer to all the colors listed in the brand.

Tangee (George W. Luft Co., NYC). 98¢ (30¢). *Red-Red* (4); *Medium Red* (3); *Natural* (8), orange-colored stick, stain only, no pigment; *Theatrical Red* (1). Adherence good; application satisfactory; consistency medium; perfume good.

Dorothy Gray (Dorothy Gray, Ltd., NYC). $1 (41¢). *Daredevil* (2), brilliant shade, glossy appearance; *Crimson Glory* (5); *Red Letter Red* (6), rich burgundy shade, glossy appearance; *Nut Brown Red* (8), rich brown-red shade, glossy appearance. Adherence good; application satisfactory; consistency medium; perfume good.

Photo Finish (Elmo Sales Corp., Philadelphia). $1 (46¢). *Starlet Bright* (2), perfume fair (slightly rancid); *Prism Pink* (7), light fuchsia, perfume poor (slightly rancid); *Candid Red* (3), perfume poor (slightly rancid); *Flash Red* (6), perfume fair. Adherence good; application satisfactory; consistency medium, tacky; medium gloss.

Lenthéric (Lenthéric, NYC). $1 (46¢). *Medium* (1), good gloss with strong stain; *Confetti Pink* (7); *Rocket Red* (2); *Gaucho* (6). Adherence good on all except *Confetti Pink*, which was fair; application satisfactory; consistency medium; perfume good.

Max Factor Hollywood Tru-Color (Max Factor & Co., Hollywood). $1 (34¢). *Natural Red* (8), deep brown-purple red; *Medium Red* (8), slightly browner than *Natural Red; Vivid Red* (2), quite dark; *Deep Red* (8), slightly redder than *Natural Red*. These lipsticks are rich in color and especially good under artificial light, but not suitable for everybody. Adherence good; application satisfactory; consistency greasy, tacky; perfume good.

Yardley Bond Street (Yardley, NYC). $1 (32¢). *Full Red* (3); *Holly Red* (2), left medium stain on cotton; *Cherry* (3), slightly pink; *Vivid* (1). Adherence fair; application satisfactory; consistency medium; all were soft, and all except *Full Red* were tacky.

Chen Yu (Associated Distributors, Chicago). $1 (42¢). *Flame Swept Red* (2), adherence good, consistency medium, perfume good; *Dragons Blood Ruby* (6), adherence fair, consistency greasy, perfume fair; *Golden Mauve* (3), adherence good, consistency dry, perfume fair (slightly rancid); *Powder Blue Fuchsia* (2), adherence good, consistency medium, perfume poor (greasy odor); *Exotic Pink* (8), adherence fair, consistency greasy, perfume fair. Application satisfactory.

Prince Matchabelli (Prince Matchabelli, Inc., NYC). $1 (44¢). *Red-Red* (3), left strong stain on cotton, perfume fair; *Black Cherry* (6), left medium stain on cotton, perfume fair; *Fuchsia Tulip* (7), dark fuchsia shade, tacky, medium gloss, perfume poor (slightly rancid); *Holly Berry* (8), pink-fuchsia shade, tacky, medium gloss, perfume fair (slightly rancid and strong). Adherence fair on all except *Holly Berry*, which was good; application satisfactory; consistency medium.

Coty "Sub-Deb" (Coty, NYC). $1 (28¢). *Bright* (2), orange cast with bluish undertone, application satisfactory, little gloss; *Light* (1), application satisfactory; *Medium* (8), dark red, rather muddy shade, application too soft, heavy and uneven. Adherence fair; consistency dry; perfume fair.

Revlon (Revlon Products Corp., NYC). $1 (27¢). *Bright Forecast* (7), bright shade, good gloss; *Cherry Coke* (8), dark purple-brown shade, rich evening color; *Amoa Red* (3), brilliant shade, rich color; *Chilibean* (7), more delicate shade of fuchsia than *Bright Forecast*. Colors rich and especially good under artificial light, but not suitable for everybody. Adherence fair; application satisfactory; consistency greasy; perfume good.

Elizabeth Post (Elizabeth Post, NYC). 25¢ (9¢) *Vivid* (between 3 and 4), adherence good; *Pink Twilight* (7), dark fuchsia, left medium stain on cotton, adherence good; *Raspberry* (8), red overtone on fuchsia undertone, adherence fair; *Champagne Red* (7), similar to *Pink Twilight* but slightly darker and different hue, adherence fair. Ease of application satisfactory; consistency greasy; all had faint castor-oil odor, apt to grow stronger in time.

Harriet Hubbard Ayer (Harriet Hubbard Ayer, NYC). $1 (51¢). *Navy Red* (3), red shade leaning toward pink, adherence good, consistency medium; *True Red* (6); *Ayer Rose* (2); *Ayer Pink* (7), a light fuchsia shade. Adher-

ence fair and consistency greasy on all except *Navy Red;* ease of application satisfactory; perfume fair.

Flame-Glo (Rejuvia Beauty Labs, NYC). 25¢ (9¢). *Raspberry* (3), application too hard, consistency dry; *Ruby Red* (3), left medium stain on cotton, consistency medium; *Dynamic Red* (8), red-pink shade, consistency soft although dry; *Pinwheel Red* (2), left strong stain on cotton, consistency medium; *Medium* (1), application hard, consistency dry. Adherence good; application satisfactory on all except *Raspberry* and *Medium;* perfume poor (rancid) on all except *Medium,* which was fair.

DuBarry (Richard Hudnut, NYC). $1 (36¢). *Red Violet* (7), dark fuchsia, adherence good, perfume good; *Emblem Red* (3), dark true red, good shade, adherence good, gloss good, perfume good; *Carmeen* (2), left strong stain on cotton, adherence fair, consistency very soft but not smeary, perfume fair; *Regal Red* (4), adherence fair, consistency very soft but not smeary, perfume fair. Application satisfactory; greasy.

Barbara Gould (Barbara Gould, NYC). $1 (30¢). *Medium* (3), weak stain (undertone), adherence fair, consistency greasy; *Pink Camellia* (8), pink shade, weak stain, adherence poor, application very soft, consistency greasy; *Red Magic* (6), purple undertone, adherence fair, consistency medium, perfume poor (slightly rancid); *Skylark* (4), adherence good, consistency dry. Application satisfactory on all except *Pink Camellia;* perfume fair on all except *Red Magic.*

Elizabeth Arden (Elizabeth Arden, NYC). $1.50 (79¢). *Cyclamen Daytime* (7), light fuchsia, application too soft, perfume good; *Cyclamen Evening* (7), hard bright fuchsia, application too soft, perfume good; *Montezuma Red* (2), adherence good, application satisfactory, consistency medium, perfume fair; *Ruby* (7), dark fuchsia, application satisfactory, perfume fair. Adherence fair and consistency greasy on all except *Montezuma Red.*

Embassy (Vantine, NYC). 20¢ (11¢). *Embassy Red* (5), adherence good, application satisfactory, consistency medium; *Plum* (5), color similar to *Embassy Red,* adherence good, application too hard, consistency dry; *Vivid* (2), orange top tone and strong blue undertone, adherence fair, application satisfactory, consistency greasy; *Wine Red* (6), very dark, adherence fair, application too soft, consistency greasy. Perfume good.

Daggett & Ramsdell (Daggett & Ramsdell, NYC). $1 (40¢). *Fuchsia Red* (7), moderate fuchsia shade, perfume fair; *Manhattan Red* (8), dark brownish-red, perfume poor (rancid); *Cherry Red* (8), light brownish-red, perfume fair; *Red Rose* (2), perfume poor (slightly rancid). Adherence fair; application satisfactory; consistency greasy.

Helena Rubinstein (Helena Rubinstein, NYC). $1 (35¢). *Red Raspberry* (2), perfume poor (rancid); *Cochinelle* (between 3 and 4), softening point too high, perfume poor (rancid); *Red Velvet* (8), red with brown cast, perfume fair; *Plush Red* (between 5 and 7), application too soft, consistency greasy, perfume fair (slightly rancid). Adherence fair; application satisfactory and consistency medium on all except *Plush Red.*

Irresistible (Irresistible, Jersey City). 10¢ (6¢). *Vivid* (1), very heavy coating, adherence poor, consistency medium; *Candy Stripe Red* (between 3 and 4), application satisfactory, consistency greasy; *Schoolhouse Red* (2), consistency medium; *Ruby Red* (4), consistency greasy; *Raspberry* (4), similar to *Ruby Red* but with fuchsia hue, consistency greasy. Adherence fair on all except *Vivid;* application too soft on all except *Candy Stripe Red;* perfume good.

House of Westmore (House of Westmore, Inc., Hollywood). 50¢ (16¢). *Garnet* (6), heavy coating, adherence fair, application satisfactory, consistency greasy; *Strawberry Blonde* (8), pink shade leaning toward orange, adherence fair, application too soft and smeary, consistency greasy; *Pepper Red* (2), adherence poor, application too soft and smeary, consistency greasy; *Debutante* (1), adherence poor, application too soft, consistency very dry and dull, perfume poor (rancid); *Glorious Red* (2), left medium stain on cotton, adherence fair, application satisfactory, consistency rather dry. Perfume fair on all except *Debutante.*

Elizabeth Kent (Elizabeth Kent, NYC). 39¢ (17¢). *Vivid* (1), adherence poor, application excessively oily and smeary; *Medium* (between 2 and 3); *Grape Wine* (7), light fuchsia; *Rio Red* (2), leaning toward rust, left medium stain on cotton. Adherence fair and application satisfactory on all except *Vivid;* consistency greasy; perfume fair, but with faint castor-oil odor, apt to become stronger in time.

Don Juan (Don Juan, Inc., NYC). $1 (42¢). *Hostess Red* (5), application satisfactory, consistency very greasy, perfume poor; *Raspberry* (8), deep purple, application satisfactory, perfume poor; *Military Red* (8), dull brownish red, adherence poor, application too soft, consistency dry, lacks gloss, perfume good; *Trousseau Pink* (7), application too soft, very glossy appearance, perfume fair. Adherence fair and consistency greasy on all except *Military Red.*

Louis Philippe Angelus (House of Louis Philippe, Jersey City). 79¢ (31¢). *Light* (2), adherence good, application satisfactory, consistency medium and creamy, perfume good; *Coronation Red* (2), brilliant shade with high gloss, adherence fair, application too soft, consistency greasy, perfume fair; *Formal Red* (2), orange-pink hue, adherence good, application satisfactory, consistency medium, perfume good; *Framboise* (1), adherence poor, proper application difficult (too soft), consistency greasy, perfume fair. All except *Light* left strong stain on cotton.

Kissproof (Affiliated Products, Inc., Jersey City). 10¢ (7¢). *Red Galore* (8), rusty shade, good gloss, adherence good, application satisfactory; *Raspberry* (8), dark purple-brown, very muddy color, adherence poor, application too soft; *Natural* (3), rather dark and dirty red shade, lacking in brilliance, adherence fair, application satisfactory. All left strong stain on cotton; consistency medium; perfume poor (slightly rancid).

Guerlain Rouge à Levres (Guerlain, NYC). $1.50 (51¢). *Dark* (8), dark red with brown-blue hues, left medium stain on cotton, adherence fair, application satisfactory, perfume fair; *Cattleya* (8), red with pink-fuchsia hues, adherence fair, application satisfactory, perfume fair; *Light* (1), adherence poor, application smeary, perfume poor. Consistency greasy on all.

Pond's "Lips" (Pond's Extract Co., NYC). 49¢ (15¢). *Rascal Red* (2), adherence fair, application satisfactory; *Dark Secret* (6), very dark, left strong stain on cotton, perfume poor; illegible color marking on two lipsticks, both judged (7), dark fuchsia. Adherence poor and application too soft on all except *Rascal Red;* consistency greasy; perfume fair on all except *Dark Secret.*

Watch for . . .

Work on the following reports, among others, is either now under way or scheduled to begin soon:

- Storage Batteries
- Rayon Slips
- Face Powder
- Radios
- Electric Refrigerators
- Electric Irons
- Hair Shampoo
- Cleansing Cream
- Canned Citrus Juices
- Maple Syrup
- Flashlight Batteries
- Soapless Cleaners

WINTER CARE

of your car

Your war-weary car faces another Winter—its fourth, at least. This year brings some improvements, but every motorist continues to be plagued by the same old bogeys: Will I freeze up? Will I start? What about the oil? Will I get there and back? How much will this Winter take out of my car?

To help you get the most out of your car while taking the least out of your car, we pass on this Winter motoring advice, prepared by CU's automotive consultant.

ELECTRICAL SYSTEM

The storage battery, on which you depend to start your car, has the unfortunate characteristic of growing more and more impotent the colder the weather. On a cold Winter morning it often has power for only the briefest cranking. If you can't get your engine to fire *at all* in ten seconds, something is most assuredly wrong (unless the car has not been used for several days) and prolonged cranking is not likely to help. Lay off for a minute or two, then try again.

While the battery is cranking the engine, there is very little "juice" left for ignition purposes, just when a hot spark is most needed. Elimination of all possible resistance in the circuit will give you better results, and should be an important part of your Winter preparation.

Clean all corrosion from the battery terminals. Get busy with sandpaper or emery cloth and brighten, then tighten, all connections: battery ground strap to frame, engine ground strap (if your car has one), both battery terminals, starter post, ignition switch, and ammeter terminals if you can reach them.

Scour the high tension leads (the big wires) at the coil, at the spark plugs, and at the distributor cap (clean the inside of it, too, but remove emery dust thoroughly). See that the plugs themselves are clean and that gaps are properly set—.025 inch is a good setting. If you are fairly handy you can do all this yourself, and you will be very glad you did, come zero weather. Have the ignition points checked, too, by someone who knows how. Worn or oil-soaked wiring is worth replacing, if you can invest the money.

But the battery is still the bottleneck. If it isn't fully charged or won't hold a charge, you're in for trouble. A home charger, if you're lucky enough to own one, will solve your problem. Anyway, spare the battery as much as possible by minimum use of current-draining accessories—don't have your headlights, stop lights, radio, cigarette lighter and heater all going at once at every red traffic light, for example.

LUBRICATION

During wartime, CU's recommendations for Winter crankcase oils were based on the driving speed limit of 35 m.p.h. In that case, since there was no danger of "thinning out" the oil by fast driving, the important thing was to keep it thin enough for easy starting, even adding kerosene to SAE 10-W oil, if needed, for this purpose.

This Winter many States have lifted the 35 mile speed limit. If you drive faster than 35 much of the time, therefore, the oil must be heavy enough to stand up at higher speeds, yet thin enough so that the starter can crank the cold engine rapidly (A slight difference in cranking speed makes a tremendous difference in ease of starting.) For normal Winter temperature, SAE 10-W oil is recommended. (SAE numbers indicate a standard viscosity, or "thickness," of the oil, and have no reference to its quality.)

Engines that are used chiefly in short distance driving can still benefit by addition of 10% to 20% kerosene. Should the car subsequently be driven hard, the only thing that will happen is that the kerosene will burn off; there will be no ill effects to the engine. Most car manufacturers recommend the addition of kerosene where Winter temperatures run below zero.

FOR STOP-AND-GO DRIVING

If you drive your car frequently at moderate speeds far enough to warm it up thoroughly (for 30 miles or over), you will have no special Winter lubrication problem aside from cold starting. In this case you don't need to change your oil oftener than every 2000-2500 miles.

In an engine driven only a mile or two after a cold start, then parked long enough to get cold again, it is almost impossible to prevent water formation, corrosion, over-dilution of the oil in the crankcase by unburned fuel, and the formation of sludge. In such cases, monthly oil changes are not excessive. (An oil filter ordinarily helps prevent sludge, but the average passenger car filter installation is not effective in the above type of service.)

If your own driving regimen is somewhere between the two extremes, change your oil accordingly. The average Winter driver will find 1000-1500 miles a suitable interval.

Drain oil only when it is hot. Do not use flushing oils unless they are put in hot. Make sure the intake for the crankcase ventilating system (usually the oil filler cap) is clean.

WARNING: Do not change to a detergent-type oil, such as was recently announced by Socony Vacuum, un-

less you are sure no sludge has formed in your engine. To make certain, remove the crankcase oil pan or valve cover plate and look. You can be fairly certain that there is some sludge formation if your engine has no oil filter and the oil looks clean when you drain it after use in stop-and-go winter driving. Detergent oils are designed to keep sludge-forming matter in suspension so that it will not build up in the engine; but they will also dislodge sludge already present, which may then clog oil lines or strainers with disastrous results. In this connection, B. E. Sibley wrote in the February 1945 issue of the Society of Automotive Engineers *Journal:* "Experiences have been encountered in which sludging or oil passageway plugging occurred, when an effective detergent oil was placed in service in a dirty engine that had been using a non-detergent oil or an oil of another type. . . . We want to emphasize the point that when a change is made to a detergent-type oil, it is . . . important that the engine be thoroughly cleaned . . ."

OTHER LUBRICATION: Compared with the engine, lubrication of the rest of the car is simple. Transmission lubricant must be thinner in Winter for easy shifting and better circulation around the gears. Either change to a thinner grade or add half a pint of kerosene. Hypoid rear axle lubricant should be changed to a Winter grade. If steering is stiff, change steering gear lube or dilute with kerosene.

Lubrication of chassis bearings—the "grease job"—should be more frequent in Winter, because greasing helps to keep out or expel water and slush from the bearings.

FUEL SYSTEM

Winter problems involving the fuel system are few: to remove and keep water or ice from the fuel tank and lines, and to be sure the choke closes properly so that the engine will start.

You can drain off any water in the tank by removing the plug at the bottom when it is nearly empty. Disconnect the fuel line at the pump, remove the gas tank cap, and blow the line clear with high pressure air. Drain and clean the fuel pump strainer, the carburetor float bowl, and the strainer where gasoline enters the carburetor. Accumulation of water thereafter is unlikely unless water is added with the fuel, but chances of condensation are less if you keep the tank nearly full.

The carburetor choke, whether manual or automatic, must close for cold starting. This is easy to check. Unscrew the wing nut on top of the air cleaner and remove the lid, or remove the whole cleaner, then look down the throat of the carburetor and watch the choke valve while someone starts the engine from cold. An automatic choke should close the valve tight, then open it slightly as soon as the engine starts.

The gasoline you buy this Winter will start you more easily than wartime fuels. There is no appreciable advantage in buying Ethyl gas to get a better start. The higher octane number of Ethyl gasolines indicates only their anti-knock superiority.

CAR EXTERIOR

Assuming that your car still has an exterior worth preserving, special Winter care of it should be concerned with preventing corrosion of chassis and sheet metal, either from soaking by snow and slush or by calcium chloride or salt used on city streets. Corrosive action of the latter can be stopped by washing with clear water, with special attention to the running gear, the undersides of fenders and road splash on the grille and front end.

A continually wetted or snow-covered car will begin to rust at edges or joints of sheet metal, around sealing strips which retain moisture (as at the lower edges of doors and door-sills—the rocker panels—and around the trunk lid). Rust forms also under decorative moldings and, of course, at any place where paint is knocked off. The body shell also rusts out from inside, but there isn't much you can do about that unless you keep the car in a glass case.

Chromium plating can be protected to some extent by a wax coat applied after cleaning. Soak joints in the sheet metal with liquid floor wax, which can also be brushed down behind moldings. Wipe standing water from window grommets and door seals; a coat of wax on the latter

Notes on Antifreeze

If your car's cooling system is already old and rusty, don't flush it out too thoroughly, for you may start leaks. Spring is a better time to flush, in any case. Just drain and rinse thoroughly with plain water.

Put in antifreeze, add a rust inhibitor if the antifreeze doesn't contain one (most do), and fill with water, leaving room for expansion. Watch for leaks the next few days, then see that all hose connections are tight.

If your cooling system is tight, use an antifreeze such as *Prestone* or *Zerex* (ethylene glycol) if you can get them. Keep a little extra solution, mixed in the same proportions, in reserve to make up small losses.

For a system with leaks, or for minimum initial cost, use alcohol, preferably ethanol or isopropyl alcohol; methanol fumes can be toxic under certain conditions. Don't build up too strong a solution at first—you may lose it in a mild spell. Listen to the weather forecasts and add alcohol accordingly.

In testing the strength of the solution, use a hydrometer with a thermometer attached, so that specific gravity can be correlated with the actual solution temperature. Unless the tester is calibrated for the antifreeze you are using—for the specific kind of alcohol, or for ethylene glycol—freeze-up may result from inaccurate readings.

If you have been forced to switch from a permanent antifreeze to alcohol, replace the high-temperature thermostat, if you have one, with a unit opening at 140°-150°.

With either type of antifreeze, cover up vents in the hood and block off the radiator so that the water temperature will go up to 180°-190° (with ethylene glycol) or around 160° (with alcohol) in sustained driving. Your objective is to raise the underhood temperature as well as to keep the cooling water hot. If you use alcohol, letting the engine idle—a good idea at any time—will diminish after-boiling of the solution and check loss of strength.

Unless you make fast runs frequently, wiring the manifold heat control in its closed (cold engine) position is recommended to give you a quicker warmup.

might help, too. Remove the rust from bare spots and apply touch-up enamel if your car is black or if you don't care how it looks; use clear lacquer if you can't find a matching color. New abrasions should be coated before rust starts, if possible.

GETTING THERE AND BACK

Every experienced motorist has his own way of coping with Winter driving conditions, but a few hints may prove helpful. There is an endless list of recipes, running from glycerine to half an onion, for preventing or removing ice formation on the windshield. Here's another: try your wife's clothes sprinkler with a little alcohol in it and a hardwood block with a sharp edge which will not scratch the glass.

Simple loss of traction on ice can be overcome by the use of sand. Carry a bucket or sack of it in the trunk. If you stall in deep snow or mud, back up in your own tracks, then rush the snow; repeat as soon as forward motion ceases. *Never* spin the rear wheels, with chains or without, once you see you're not getting anywhere. Spinning ruins tires and chains if the pavement is hard; and if the ground is soft, you'll dig yourself in so deep it will take a professional to excavate you. Try shovelling instead; a narrow scoop shovel works well and is easy to carry.

Where traction is poor the underlying principle for progress is this: substitute the car's momentum for the loss in traction. Climb a slippery hill, for instance, by getting up speed at the bottom and easing up on the accelerator on the way up so that you barely drift over the top. Get out of ruts or holes by "rocking" the car, building up momentum by a little push forward and a little push backward—it requires quick shifting and good coordination with the throttle —until you are carried up out of the hole and on your way.

Sliding sidewise into icy ruts and holes is tough on front wheel bearings. To minimize the possibility of breakage, make sure that front wheels have a minimum of "play" or looseness on their spindles. Check this by grasping the top of a front wheel and shaking it to and fro.

Finally, if you are on either end of the Good Samaritan act ("just give me a little push down the street"), make sure that the car being pushed is in high gear and no other when the driver engages his clutch.

Home Dyeing

Results are not guaranteed, but CU's technicians come up with some helpful advice and brand ratings

Home dyeing of stained or faded garments is by no means a universal panacea for restoring them to usefulness. But, properly done, on certain fabrics, and with the right amount of a good dye, it should be possible to retrieve many garments which might otherwise be so unattractive as to be discarded. But good dyes are not easy to find, CU's tests of 41 colors in six different widely-sold brands showed. Many fail completely to reproduce the brilliant hues shown on labels or charts; others spot despite the greatest care; still others fade too easily under conditions of use. In the great majority of cases, the instructions given on the labels were either inadequate or inaccurate, and it was generally necessary to use far more dye than called for by the directions to achieve satisfactory results.

PRECAUTIONS

Before you decide to dye any garment at home, however, there are certain things you should consider:

IS IT WASHABLE? The process of home dyeing calls for soaking the garment in boiling-hot water for some time. Cottons, silks and many rayons will withstand this treatment; most woven woolens won't. Although home dyeing is economical for fabrics that can take it, commercial dyeing (with a guarantee on shrinkage and color of the finished product) may be a better answer to the problem of color change with garments you value highly.

CAN ITS PRESENT COLOR BE COVERED? The color of the finished product is affected by its color before dyeing. If the original was a brightly-colored or print fabric, you can't expect to obtain the same shade as if you had started with a white cloth. It may, in fact, be necessary to bleach the color out of colored material before you can expect satisfactory dyeing results.

IS THERE MORE THAN ONE TYPE OF FIBER IN THE WEAVE? Certain dyes have widely different effects on different fibers. Consequently, if the material you want to dye is made of a combination of them (rayon and cotton, or silk and wool, for example), it is important that you dye a test sample first, to avoid the possibility of bizarre effects.

COLOR QUALITY

You may go wrong at the very outset — in selecting a color. The name stamped on the package as well as the sample shown on the manufacturer's color chart is likely to lead you astray.

In testing 41 colors of six brands of dyes, CU found that there was not a single color of a single brand which would dye cotton, wool, silk and rayon all the same shade. Some results were startling. A dye labeled "Garnet" dyed wool wine, cotton lavender, silk old rose, rayon garnet, and left acetate rayon white. This confusion is further confounded by the fact that color names are not standardized. "Tan" to one dyehouse may be "beige" to another, "ecru" to a third and "bronze" to a fourth. And under the label "green" you are liable to find anything from pale jade to olive drab.

COLOR STRENGTH

The strength of the color is another source of frequent disappointment. The directions on the package almost invariably understate the quantity of dye required to give a good, strong shade. In some cases, eight times the quantity recommended was needed before a satisfactory navy, black or brown was produced. The lighter shades were sometimes satisfactory when the directions were followed exactly, though in many cases they, too, needed a little extra dye to bring out the full color.

Contrary to the suggestion made by some manufacturers, the shade cannot be ascertained by dyeing a small piece of cloth in the dye bath first. The final shade is determined

by the amount of dye used on a specific amount of cloth in a specific amount of water; the smaller the cloth, the deeper the shade. Of course, by reducing the quantity of dye, water and cloth in mathematical proportion to the amount used ordinarily, a sample piece could be made, but this is too complicated to be practical. The only method you can follow at home is continued redyeing in a new bath until the desired color depth is produced. (Notes in the ratings indicate the number of packages required to produce good color.)

COLORFASTNESS

Colorfastness, another important quality in a dye, was determined by three different tests by CU's technicians. Rayon and cotton samples which had been dyed exactly according to instructions on the package were tested for fading from sunlight, from perspiration and from laundering.

Sunlight and laundering did more damage than perspiration. Cotton showed poorer resistance to fading than rayon with most dyes. Certain colors, notably ecru (beige) and pink, were found to stand up better than others. In the perspiration tests, the dark colors "bled" (stained) worse than the light.

SPOTTING

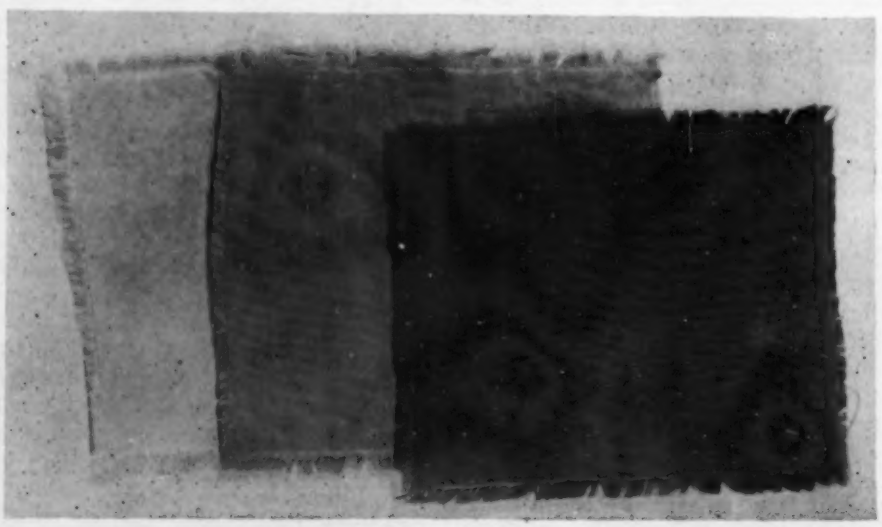
Dyed samples were examined not only for quality of color, but also for spotting. Results were noted with cotton and with rayon which had been dyed (1) according to directions, (2) at one and a half times directed strength, (3) at two and a half times directed strength, and (4) at four times directed strength.

If spotting was present pretty consistently throughout the different concentrations and colors, a brand was considered unsatisfactory. *Tintex* and *Rainbow* both spotted badly with few exceptions, and are found at the bottom of the ratings on that account. (*Tintex* rated low on poor performance in other tests as well, but *Rainbow* would have placed second if it had yielded a uniform color.)

FABRIC FACTORS

By and large, ordinary rayon can be dyed much more satisfactorily than cotton. The sheen of the material helps to give life to the color; also, the colorfastness with rayon is far superior to that with cotton. Brown dye and cotton cloth seemed to be mutually antagonistic in the tests.

Acetate rayon (celanese) exhibits the most stubborn resistance to dyeing, and some manufacturers state on the package that their dyes will not "take" on this material. *Tintex*, however, which claims to dye "every fabric . . . rayon, celanese (acetate rayon) . . ." in actual fact produced a strong brown tone on celanese with black dye. *Tintex* "brown" dyed celanese a light golden brown tone even when used in strong concentration which dyed other fabrics dark brown. *Rainbow* did not color celanese. *All Purpose Rit*, however, claimed to dye



Three samples of a material were dyed with the same dark color; reading left to right: dye strength according to instructions on the box, at 2½ times, and at 4 times directed strength.

To help you locate at a glance the brand which will give the best results for the color you want, CU has compiled the following list based on the tests conducted in CU laboratories. The numbers in parentheses following the brand names show the approximate number of packages required to produce a reasonably strong shade in dyeing the maximum amount of cloth indicated in the directions on the package. Cotton and rayon are listed separately. (Note comments.)

ON RAYON

Jade Green	**Diamond** (1); **All Purpose Rit** (1)
Green	**Rainbow** (1)
Ecru (Beige)	**Putnam** (1); **Rainbow** (1)
Tea Rose	**Tintex** (1)
Rose Pink	**Instant Rit** (1)
Pink	**Putnam** (1); **All Purpose Rit** (1)
Garnet	**Putnam** (2½)
Cardinal Red	**Diamond** (1½)
Scarlet	**Rainbow** (2½); **Instant Rit** (2½)
Navy Blue	**Diamond** (2½)
Dark Brown	**All Purpose Rit** (1½) Good color but bad colorfastness.
Golden Brown	**Putnam** (4) Bad colorfastness except in laundering.
Black	**Diamond** (2½) Poor laundering; **Rainbow** (1) Poor laundering.

ON COTTON

Jade Green	**Diamond** (1) light; **Instant Rit** (1) dark.
Ecru (Beige)	**Instant Rit** (4) Poor laundering, light; **Tintex** (1½)
Tea Rose	**Tintex** (1½)
Rose Pink	**Instant Rit** (1)
Pink	**All Purpose Rit** (1)
Garnet	**Putnam** (2½) Poor colorfastness in perspiration test.
Scarlet	**Rainbow** (4); **All Purpose Rit** (4) Poor laundering.
Navy Blue	**Instant Rit** (4) Poor sunfastness.
Jet Black	**Putnam** (4); **Diamond** (4)

celanese and did so very well; some of its most attractive colors were produced on celanese.

HOW CU TESTED

In testing for colorfastness, samples were exposed in a Fadeometer to rays similar to those of direct sunlight. It was found that the cotton samples faded much more quickly than the rayon. A home-dyed rayon, especially in ecru or pink, could probably be hung in sunlight for some time without showing serious fading, but a cotton would be likely to change color quite quickly.

For the perspiration tests, an alkaline "perspiration" solution was used and changes in color were noted after immersion of the samples in the solution. Here again, rayon performed better than cotton. The most generally satisfactory colors were ecru, pink and navy, but navy was found unsatisfactory when it was tested for "bleeding" or staining. (This was done by rolling white cloth containing cotton and rayon threads with the dyed material while it was wet with the perspiration solution. The dark colors "bled" worse than the light.)

To test for fading from laundering, samples were washed in a 5% soap solution for a half hour at 110° F. More than half of the rayon samples faded badly, and the cotton samples gave an even worse performance.

In the ratings of the six brands tested, colors which produced good results (with respect to color quality) on rayon and cotton are indicated. While *Rainbow* and *Tintex* brands are rated "Not Acceptable" because of spotting, a few colors of these brands, noted in the ratings, gave acceptable results. (See the color chart on page 10 for a handy guide to help you select the dye you want.)

Brands are listed in approximate order of over-all quality. Colors listed under each brand gave the best results for rayon or cotton as indicated. The number in parentheses after each color indicates the number of packages which were required for a reasonably strong shade in dyeing the maximum amount of cloth indicated in the directions on the package.

ACCEPTABLE

Diamond (Wells & Richardson Co., Burlington, Vt.). 10¢. ON RAYON: jade green (1); cardinal red (1½); navy blue (2½). ON COTTON: jade green (1).

Instant Rit (Rit Products Corp., Chicago). 2 for 25¢. ON RAYON: scarlet (2½); rose pink (1). ON COTTON: rose pink (1).

Putnam Fadeless (Monroe Chemical Co., Quincy, Ill.). 10¢. ON RAYON: garnet (2½); pink (1); ecru (1). ON COTTON: garnet (2½). Poor colorfastness in perspiration test.

All Purpose Rit (Rit Products). 25¢. ON RAYON: jade green (1); pink (1). ON COTTON: pink (1).

The following colors of the brands listed above gave less satisfactory results:

Diamond: black, curtain ecru, pink, seal brown; **Instant Rit:** navy, jet black, golden ecru, dark brown, jade green; **Putnam Fadeless:** black, navy blue, golden brown, jade green; **All Purpose Rit:** jet black, navy, scarlet, dark brown.

NOT ACCEPTABLE

The following were considered generally "Not Acceptable" because of spotting. The few exceptions are noted.

Rainbow (Rainbow Dye Corp., NYC). 3 for 23¢. ON RAYON (3 of 7 colors spotted); good colors: green (1); ecru (1); scarlet (2½). ON COTTON (6 of 7 spotted); good color: scarlet (4).

Tintex (Park & Tilford, NYC). 10¢. ON RAYON (6 of 7 spotted); good color: tea rose (1). ON COTTON (5 of 7 spotted); good colors: ecru (1½); tea rose (1½).

The following colors of the brands listed above showed excessive spotting:

Rainbow: black, navy blue, pink, dark brown; **Tintex:** black, navy blue, old glory red, jade green, brown.

Liquid Window Cleaners

CU tests 10 brands and finds they all do the job

Any commercially sold window cleaning fluid you buy can be counted on to get your windows clean—not all by themselves, of course, but combined with "elbow grease." How much elbow grease is the central issue.

A chemical analysis of the contents of various brands can, however, give a comparative indication of how much help you are getting from the particular brand you use. Testing ten widely sold brands, CU's technicians found they all had what it takes, some in greater degree than others.

WHAT IT TAKES

There's nothing very complicated or mysterious about the composition of cleaning fluids or how they work. You can make your own—a very effective and cheap mixture—by adding a little household ammonia to water and applying with a spray. (Many housewives object to ammonia, however, because it has a disagreeable, irritating odor.) A few drops of kerosene on a damp cloth is another effective home-brewed concoction.

Commercial liquid window cleaners are water solutions containing various combinations of the following: alcohol, glycols, organic solvents, alkaline cleansers and organic detergents. To overcome the unpleasant odors of denatured alcohol and ammonia, most cleaning solutions are perfumed. Many of them are also colored, but the dye has no effect on the cleaning action.

Alcohol, ammonia and glycols cut down the amount of rubbing needed to get the window clean. Of these, alcohol is the most widely used; where it is present without the other two, the more alcohol the solution contains, the more effective it will be. Where present in combination with one or both of the other additives, effectiveness does not depend on alcohol content alone.

Alcohol and ammonia are effective for several reasons. They reduce "surface tension," enabling water to spread over the glass surface more easily and evenly. Solutions containing them dry more rapidly than plain water and therefore require less rubbing. And they enhance the liquid's efficiency in cold weather because they lower the freezing point of water. The glycols act as lubricants; alcoholic solutions wipe off even more easily when they contain glycols.

Cleaning fluids are unquestionably superior to soap and water, not only in cutting down time and labor, but in the results produced, since soap tends to leave a film on glass. When cleaning windows or other glass surfaces, use a minimum of liquid. Excessive amounts take long to dry and are likely to streak.

Applying the fluid with a spraying

device will make the job still easier. (Sprays were sold with the liquids before the war and should be making their reappearance soon.) Rubbing with a soft lint-free cloth, a chamois or a squeegee, will give best results.

The ten brands tested were examined for alcohol content and the presence of ethylene glycol, ammonia and organic sulfates. Each of them was found to contain a very small percentage of organic sulfates (acting as detergents). One solution, *Prox*, contained all three additives: alcohol, ethylene glycol and ammonia. *Windex* contained ethylene glycol in addition to alcohol; and *Firestone* contained alcohol plus ammonia. The remaining seven contained alcohol only, in varying percentages.

Ratings are in order of decreasing alcohol content within each group. Figures in parentheses represent cost per fluid ounce.

Alcohol

The following brands contained alcohol plus small amounts of organic sulfates:

A-M-R Windoshine (A-M-R Chemical Co., Brooklyn). 10¢ for 8 oz. (1.3¢). Available on East Coast.

A-Penn Window and Glass Cleaner (A-Penn Oil Co., Butler, Penna.). 18¢ for 20 oz. (0.9¢). Available east of the Mississippi and on West Coast.

Collins Kleerpane Window Cleaner (D. A. Collins Mfg. Co., Brooklyn). 20¢ for 24 oz. (0.8¢); 10¢ for 8 oz. (1.3¢). Available in the East.

Aeromist Glass Cleaner (Boyle-Midway Inc., Jersey City). 23¢ for 24 oz. (1¢); 10¢ for 8 oz. (1.3¢).

Co-op Window Spray (National Co-operatives, Chicago). 17¢ for 16 oz. (1.1¢).

Renuzit Window Cleaner (Radbill Oil Co., Philadelphia). 10¢ for 10 oz. (1¢).

Maid of Honor Glass Cleaner (Sears, Roebuck & Co.). Cat. No.—6589. 15¢ for 8 oz. (1.9¢) in retail stores; 18¢ plus postage for 1 pt. (1.1¢) by mail order.

Miscellaneous

The following contained other substances in addition to alcohol and organic sulfates (see comments):

Prox Window Cleaner (Proxite Prod. Inc., Brooklyn). 10¢ for 8 oz. (1.3¢). Also contained ethylene glycol and ammonia.

Windex (Drackett Co., Cincinnati). 12.5¢ for 6 oz. (2.1¢). Also contained ethylene glycol.

Firestone Glass Cleaner (Firestone Tire & Rubber Co., Akron). 29¢ for 12 oz. (2.4¢). Also contained ammonia.

Canned Peaches

U.S. government inspectors test and grade 29 brands of halves and slices for CU

To help you get the best quality for your money, CU submitted 29 brands of canned peaches (halves and slices) to the U. S. Department of Agriculture to be examined and graded.

Factors taken under consideration were: tenderness and texture; defects; color; uniformity; drained weight; and percentage of sugar in the syrup. Of these factors, tenderness and defects outweigh the others, rating 35% and 30%, respectively, of the total score.

To rate high in "tenderness" the peaches must be thick and meaty, not soft and not tough. Pieces of skin, careless peeling and trimming, blemishes such as scabs, mechanical injuries or discoloration, and irregular shape due to excessive trimming, crushing or breaking are considered defects. Products which do not rate above Grade C in these factors may not be graded higher regardless of total score.

CLINGSTONE vs. FREESTONE

Yellow clingstone peaches are the variety most generally packed because they ripen evenly, have good texture and uniformity — qualities which make for a good canned product. Although most varieties of clingstone peaches used in canning are inferior in flavor to freestone peaches, the naturally ragged and stringy appearance of the freestone variety is probably one reason why considerably less of them are canned commercially.

Of the 29 brands examined, only two were freestone—*American Lady* Elberta Peaches and *Monarch* Freestone Shortcake Peaches. If you are one of the many people who object to the slippery feel of canned clingstone peaches, you might try the canned freestone variety. They lack the rich supply of gummy materials which give the clingstone peaches this quality.

SUGAR CONTENT

The percentage of sugar in the syrup is not considered a quality factor, as the "desirable" percentage is largely a matter of taste. Label designations of "light," "heavy" or "extra heavy" tell the consumer how sweet the syrup is and how sweet the fruit will be. Because of sugar shortages, you may expect to find more brands packed in light syrups than has been the case heretofore.

SYRUP STANDARDS

According to government standards, "light" syrup should contain 14% to 19% sugar; "heavy" should contain 19% to 24%; and "extra heavy" should contain 24% to 35%. Any syrup containing less than 14% should be labeled "water, slightly sweetened." Label statements have generally been found a reliable indication of syrup density. Of all the brands tested, only one, *Yosemite* Halves, did not carry a statement of syrup density on the label.

GRADES

The brands were graded—A, B or C—on the basis of the average score of two or three samples of each brand. Ratings are listed separately for halves and slices.

Some brands are packed under the continuous supervision of Department of Agriculture inspectors, and grade-labeled. Whenever possible, buy grade-labeled brands bearing a shield containing the words, "Packed under continuous inspection of the U. S. Department of Agriculture."

"BEST BUYS"

Although the standards require that cans be packed "as full as practicable without impairment of quality" and specify minimum drained weights (i.e., weight of fruit without syrup) for different can sizes, considerable variation was found in the drained weight of the samples tested. CU selected "Best Buys" from among the brands rated highest by the government inspectors on the basis of cost per drained pound, rather than on the cost of a No. 2½

can (1 lb. 13 oz.) of fruit and syrup.

Prices of the brands tested ranged from 17.5¢ per drained pound (*Highway* slices) to 38.7¢ (*Royal Scarlet* slices), both rated "Grade B." You can get a "Best Buy" for 18.3¢ in the Grade A *Hunt's* halves; *Monarch* Freestone slices at 30.4¢ rated only "Grade C."

Listings are in order of quality within each group.

Prices are for a No. 2 can (1 lb. 13 oz.). Figures in parentheses represent cost per pound, based on drained weight.

Halves

The following were yellow cling peaches unless otherwise noted:

BEST BUYS

Del Monte (California Packing Corp., San Francisco). 26¢ (20¢). Grade A. Packed in heavy syrup. Available nationally.

A&P Grade A (A&P, NYC). 28¢ (20¢). Grade B. Packed in heavy syrup. Available nationally at A&P Stores.

Hunt's (Hunt Bros. Packing Co., San Francisco). 24¢ (18.3¢). Grade B. Packed in extra heavy syrup. Available nationally.

ACCEPTABLE

GRADE A

Savoy (Steele-Wedeles Co., Chicago). 39¢ (29¢). Packed in extra heavy syrup..

Del Monte (see "Best Buys").

GRADE B

Sweet Life (Sweet Life Food Corp., Brooklyn). 31¢ (23.3¢). Packed in heavy syrup. Available in N. Y., Pittsburgh and Springfield, Mass.

Stokely's Finest (Stokely Bros. & Co., Indianapolis). 31¢ (23.2¢). Packed in heavy syrup. Available nationally.

A&P Grade A (see "Best Buys").

Premier (Francis H. Leggett & Co., NYC). 33¢ (23.9¢). Packed in heavy syrup. Available east of the Mississippi and in Texas.

Hunt's (see "Best Buys").

Val Vita (Val Vita Food Co., San Francisco). 24¢ (20.6¢). Packed in light syrup.

Krasdale (Krasdale Foods, NYC). 31¢ (24¢). Packed in heavy syrup. Available in N. Y.

Island Manor (H. C. Bohack Co., Brooklyn). 26¢ (18¢). Packed in light syrup. Available in Brooklyn and Long Island at Bohack Stores.

Yosemite (Filice & Perrelli Canning Co., Richmond, Calif.). 20¢ (15¢). Packed in light syrup. Available on West Coast and in N. Y. and Pittsburgh.

Co-op Grade B (National Co-operatives, Inc., Chicago). 30¢ (22.7¢). Five cans marked heavy syrup; three cans actually tested heavy syrup; two cans tested light syrup. Available nationally at Co-op Stores.

Glendale (Clover Farm Stores Corp., Cleveland). 31¢ (23.7¢). Packed in light syrup. Available east of the Rockies at Clover Farm Stores.

Highway (Sutter Canfood Co., San Francisco). 24¢ (17.5¢). Packed in light syrup. Available in West, N. Y., N. J., Washington, D. C. and Richmond, Va. at Safeway Stores.

Iona Grade C (A&P). 24¢ (18.7¢). Packed in light syrup. Available nationally at A&P Stores.

Manhattan Quality (Manhattan Grocery Co., NYC). 31¢ (24.9¢). Packed in heavy syrup. Available in NYC.

Checker (Seeman Bros., NYC). 30¢ (22.5¢). Packed in light syrup.

GRADE C

American Home (National Tea Co., Chicago). 25¢ (17.9¢). Packed in heavy syrup.

American Lady Elberta Peaches (General Grocer Co., St. Louis). 36¢ (28.6¢). Packed in heavy syrup.

Sliced

BEST BUY

All Good (F. M. Ball & Co., Oakland, Calif.). 26¢ (19.1¢). Grade B. Packed in heavy syrup. Available in the Midwest and Calif.

ACCEPTABLE

GRADE B

White Rose (Seeman Bros.). 38¢ (27.6¢). Packed in heavy syrup. Available in the East, Midwest and Calif.

All Good (see "Best Buy").

Red & White (Red & White Corp., Chicago). 32¢ (23.8¢). Packed in heavy syrup. Available nationally except in South at Red & White Stores.

Royal Scarlet (R. C. Williams & Co., NYC). 49¢ (38.7¢). Packed in heavy syrup. Available nationally.

Sun Glory Economy Grocer Stores, Boston). 24¢ (17.7¢). Packed in light syrup. Available in Conn. and Mass. at Economy Grocery Stores and Stop and Shop Supermarkets.

Air Mail (Richmond-Chase Co., San Jose, Calif.). 31¢ (24¢). Packed in light syrup. Available nationally.

Libby's (Libby, McNeill & Libby, San Francisco). 35¢ (27¢). Packed in heavy syrup. Available nationally.

Iris (Haas, Baruch & Co., Los Angeles). 30¢ (25.5¢). Packed in heavy syrup. Available in southern Calif. and Ariz.

GRADE C

S.S. Pierce Blue Brand Elberta (S.S. Pierce Co., Boston). 31¢ (20.9¢). Packed in heavy syrup.

Rose-Dale (Libby, McNeill & Libby). 35¢ (26.3¢). Packed in light syrup.

Monarch Freestone Shortcake (Reid, Murdoch & Co., Chicago). 42¢ (30.4¢). Packed in extra heavy syrup.

U. S. government grader testing samples of canned peaches for CU. Peaches were rated for tenderness and texture, defects, color, uniformity, drained weight and percentage of sugar in the syrup.

Buying Heating Equipment

CU's consultant gives expert advice on boilers, furnaces and stokers

This is the concluding article in the series on Heating Your Home. The present report covers boilers, furnaces and coal stokers, giving buying instructions and ratings.

If your installed heating equipment is not satisfactory or if you contemplate buying new heating equipment for your home, study all the reports in the series. In the August 1945 issue, we discussed small and relatively inexpensive changes in your home heating plant which can improve efficiency and reduce costs. In the September issue, we discussed the relative merits of the eight popular types of heating plants. In the October issue, relative advantages of different fuels were discussed, and practical instructions given for buying oil burners.

It pays to buy good heating equipment. And to get a good buy you need to know something about what you're buying. Knowledge of a few basic features of good and bad design in heating equipment may repay you many times over in terms of home comfort and actual cash economy.

A heating plant is a long-term investment. You cannot count on experimenting—when you buy, you buy for keeps. If you place yourself entirely at the mercy of advertising and sales pressure, you run the risk of paying a high price for a plant that will give you indifferent performance. Or if you try to improvise your own rules for economizing, you may save a few dollars at first but wind up with a shoddy plant that may make your fuel bills double what they should be.

Advertising practices are a major menace to the buyer of home heating equipment. It is a matter of record that certain flagrantly inefficient models of boilers and furnaces which had been highly ballyhooed by their manufacturers overwhelmingly outsold far superior makes which had been offered to the public with greater restraint. Two examples of phenomenal success in selling inferior equipment involve two of the best-known manufacturers.

Thousands of buyers who believed the propaganda of the American Radiator Company and bought their *Ideal Redflash* boiler are paying sky-high fuel bills and getting poor heating performance. "In it are incorporated," claimed the company's blurb back in 1929, "the scientific principles of design which have been developed during over forty years of manufacturing experience and research." A decade later, by which time this boiler had become notorious among heating experts for its fuel-wasting features, the manufacturer's sales literature blandly announced that the same boiler could do what is impossible for any boiler to do: *"Every bit of heat* is transferred to surrounding water when hot gases pass through the long, scientifically-designed flues." (CU's emphasis.)

(The *Ideal Redflash,* incidentally, was rated "Not Acceptable" by CU's consultants in previous reports because of its poor flue design, which is almost identical to the poor flues in Figure 2, and which causes great waste of fuel.)

Another inferior plant—a warm-air furnace—was sold by the Holland Furnace Company, probably the best-known name in the line. In 1938, CU found it necessary to rate Holland furnaces "Not Acceptable" because they had antiquated design features; both stack temperatures and prices ran considerably above the range of most of the "Acceptable" furnaces.

Advertising copy, on the other hand, exaggerated unimportant features and traded heavily on the company's "long-established position as the leader in the industry . . . [and] the world's largest installers of home heating systems."

Similarly, no protection is afforded to buyers by the name "General Electric," their oil burners and boilers failing to make CU's "Acceptable" list when they were rated in 1938. To complicate matters further, some manufacturers offer several lines of heating equipment, some good and others not so good; in addition, with some cast-iron boilers, certain arrangements of the sections produce efficient boilers while other arrangements of the same sections produce inefficient, unsatisfactory boilers.

Since it is demonstrably foolhardy for the buyer to place faith in the well-known trade names, he faces a difficult assignment when he sets out to buy heating equipment. Placing implicit faith in a local heating contractor is not the answer either, for the uninformed buyer of heating equipment is prey to unscrupulous practices. While buyers are advised to purchase only from local contractors who are judged most reliable, there is no substitute, in the long run, for your knowing what makes a good piece of equipment and what should be avoided.

WHAT DO YOU LOOK FOR?

What should you look for in a new

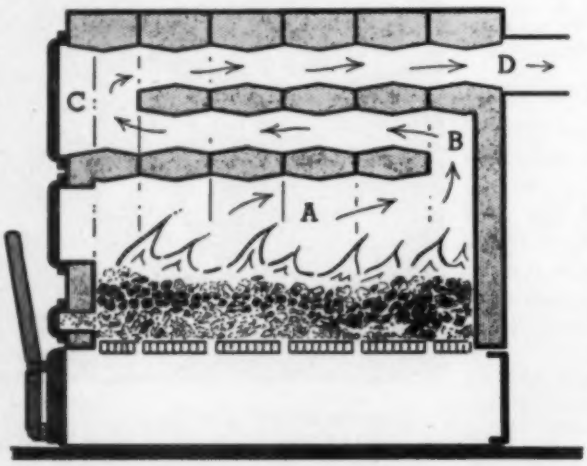


FIGURE 1.—*Cross-sectional view of a typical rectangular cast-iron boiler, fired by coal. The fire burns in combustion space A. Hot gases then travel to B where they enter the flue passages, which extend from B through C and to D, the smokepipe connection.*

boiler? (Warm-air furnaces are discussed further on this report.) It should be suitable for the fuel you intend to use in it, of course. But it does not have to be designed especially for and only for that fuel. Many boilers which were well designed years ago for coal firing, for example, give excellent performance with oil firing and are better for oil than certain boilers designed in recent years especially for this fuel.

In addition, the boiler you buy should be large enough to give plenty of heat on the coldest days. It should provide reasonably trouble-free operation. Over a period of, say, 20 years or longer, it should not cause excessive expense for maintenance and repairs. And obviously, the boiler should be efficient—you don't want one that runs up 20% to 100% higher fuel bills than a relatively efficient model.

If you buy wisely, you can get all these things in a boiler at fairly low cost, for there are many good ones on the market.

CAST-IRON OR STEEL?

Before 1930, steel boilers were used generally to heat only large buildings—factories, schools, public buildings, etc. Cast-iron boilers were standard for ordinary house-heating. When manufacturers began turning out steel boilers for home heating, they were relatively high-priced but exceptionally efficient as compared with cast-iron boilers. Cast-iron boiler manufacturers then brought out their own highly efficient models, practically as efficient as the best steel boilers, but priced lower than the steel models.

This picture started to change in 1938 when steel boiler manufacturers, eager to increase their sales volume, brought out cheap models. These were almost as low-priced as good cast-iron boilers, but they performed very inefficiently. *If you decide to get a steel boiler, select one of the old-line efficient steel boilers; avoid the cheap, low-efficiency models which have been brought out in recent years.* (If you are trying to decide between steel and cast-iron, consult the accompanying chart for comparative advantages and disadvantages with respect to your specific requirements.)

Much of the high-pressure sales talk extolling the virtues of steel is pure fiction. Two sales arguments in particular need debunking. Disregard

IRON vs. STEEL

The following is a summary of the comparative advantages and disadvantages of cast-iron and steel heating boilers:

Cast-Iron Boilers

ADVANTAGES

- In general, cast-iron boilers are tougher, more rugged, and longer-lived than steel boilers. Even when not given especially good care, many serve well for more than 30 years.
- Where the water used in the boiler contains harmful ingredients, less damage occurs to cast-iron boilers than to steel boilers.
- When damaged, sections of cast-iron boilers usually can be replaced relatively easily and inexpensively by local workmen or heating contractors.
- Cast-iron boilers of standard design are made up of sections which usually are easy to get in and out of basements of homes already built.
- The cast-iron boiler is available in models which give good fuel economy for users of coal and oil.

DISADVANTAGES

- Unless the buyer of a cast-iron boiler knows what to avoid, he may wind up with a very inefficient model (such as *Ideal Redflash* boilers, or four-section and five-section round cast-iron boilers of all makes).
- In assembling cast-iron boilers, special care must be taken by the workmen to seal all the "air leaks" between the boiler sections; otherwise fuel is wasted because cold air enters the boiler between sections and chills it. Frequently boiler manufacturers ship insufficient "furnace putty" or "furnace cement" with the boilers, and more must be supplied for proper sealing.

Steel Boilers

ADVANTAGES

- Practically all old-line steel boilers for house-heating are of excellent, efficient design—much more efficient than typical cast-iron boilers. Only the newly-developed cheap steel boilers are inferior.
- A good steel boiler is somewhat more efficient than the best cast-iron boiler. Consequently with very expensive fuel such as manufactured gas, it may be best to install a steel boiler rather than a cast-iron boiler. However, in most cases the difference in fuel cost due to boiler material is so small as to be insignificant.
- Steel boilers do not have as many "air leaks," even when poorly installed, as do poorly-installed cast-iron boilers, since steel boilers do not have joints between sections.

DISADVANTAGES

- A steel boiler is more easily damaged by poor boiler water, which occurs in certain areas, than is a cast-iron boiler. Where the water is poor or questionable, better install a cast-iron boiler.
- When steel boilers must be re-tubed or repaired, the work must be done by specialists who use special tools. Such work amounts to a major, expensive operation. Local men cannot do it in all small cities and towns. This makes for delays and inconvenience, besides running up the repair bills.
- In homes, steel boilers usually have shorter lives than do cast-iron boilers, especially if the boilers are not well cared for during the Summer months when they are attacked by dampness and corrosion. If you want a boiler to last for many years without special care, buy a cast-iron boiler.
- The steel boiler comes in a single unit which is heavy and bulky, hard to handle, and frequently very difficult to install in the basement of an already-built home without a great deal of extra work.
- Certain steel boilers, when oil-fired, give flame pulsation trouble to a much greater degree than cast-iron boilers. "Wet bottom," "Scotch" or "Scotch Marine" designs are notorious for this.

entirely the line which tries to persuade you to use steel because all large power houses have used steel boilers for years. Actually, power plants must use steel boilers rather than cast-iron because cast-iron could not withstand the very high steam pressures produced. Also, in power plants, analysis and chemical treatment of boiler water are made regularly to protect the steel from damage—a safeguard which is not practicable in ordinary homes.

The steel boiler salesman may also try to impress you with the argument that steel is flexible and bends when struck with a sledge hammer, whereas cast-iron breaks; therefore (the argument goes), with the on-off firing of an oil burner or stoker, steel stands up better under the sudden and intermittent stresses. This argument actually is more applicable to warm-air furnaces (see discussion further on); a cast-iron boiler, properly fired by an oil burner or stoker, will not be cracked or broken as a result of the intermittent firing.

CHECK WATER

Before you consider a steel boiler, check on the quality of the water in your locality. Water containing high quantities of lime, oxygen or carbon dioxide has a tendency to damage steel by its action unless it is chemically treated. Reputable heating contractors should be well informed on this point; if your contractor can't tell you, check with a consulting engineer, or submit a specimen of tap water to a laboratory for analysis.

If the water is harmful, by all means get a cast-iron boiler. According to extensive field data gathered by CU's heating experts, in areas where the water is "bad," the owners of steel boilers report frequent breakdowns and heavy repair bills from damage caused by the water. It may cost $150 to $200 to provide new tubes for a steel boiler which heats a seven-room house, and in some places, boiler tubes needed replacement after only two or three years of use.

Steam-heating plants are more likely to be damaged by unsuitable water than are hot-water plants. And if the boiler requires frequent replenishment with fresh water (owing to leaks in the system), the damage is multiplied. Any boiler lasts longer and stays in better condition when very little water is added to it in the course of a year.

If the boiler is to do the job it was meant to do—heat the entire house comfortably on even the coldest days—it must be large enough to carry the required fuel load. And to do this job at reasonably low fuel costs, the boiler must be able to absorb most of the heat from the fuel burned.

FLUE PASSAGES

That's where the flue passages enter the picture. The interior of the boiler is made up of two main parts: the combustion space, in which the fuel burns; and the flue passages, through which hot gases from the fire travel and where the water is heated before the gases go up the smokepipe.

A good, economical boiler must have well-designed flue passages. Two major features are essential to efficient performance. The hot gases must travel a relatively long distance from the combustion chamber to the smokepipe; fuel bills will be high if the flue gases reach the smokepipe after traveling only a short route.

In addition to its length, the *design* of the flues must be good. A flue passage having many small openings is generally superior to one of the same length, but with only a few large openings. Given two boilers of identical external dimensions and length of flue travel, differences in design may account for a difference of more than 50% in fuel consumption. (See Figure 2 for illustration of good and bad flue design.)

The principle involved is simple. Large openings have a relatively small total surface area, and the hot gases give off relatively little heat in traveling through them; traveling through a great number of small flue channels, broken up into many small, lively streams, the hot gases give off much more of their heat.

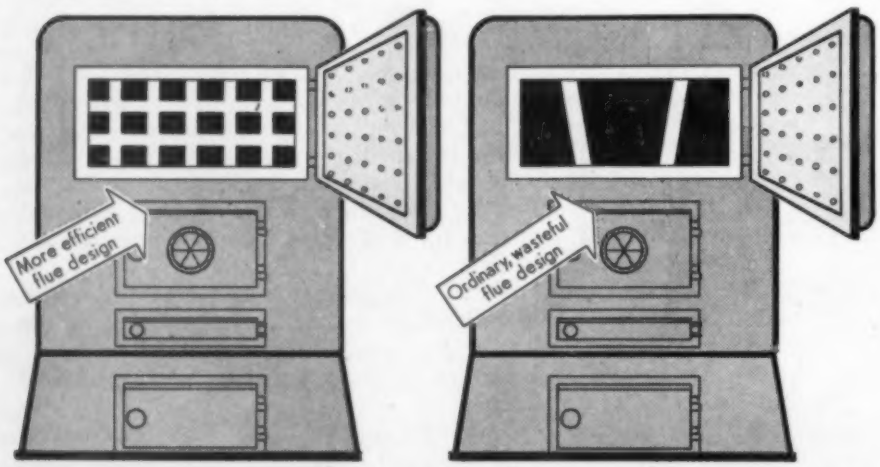


FIGURE 2.—*Two extremes in flue design. Very good flue design, illustrated by the drawing on the left, routes the hot gases through a great many small passages on their way to the smokepipe. Very poor flue design, on the right, has passages so wide that "a cat can walk through them," loses much of the heat of the gases, wastes fuel.*

BOILER SIZE

Before buying a rectangular cast-iron boiler, make certain that it has flue passages of the efficient type illustrated in the accompanying diagram. If you have a large home and are offered a choice between two boiler models, favor a boiler which is long and narrow rather than one which is relatively short and wide, for the flue travel is longer in long, narrow boilers. It may even be worth while to have your heating contractor add one or two sections to his longest standard model. No matter how small your home is, avoid buying the shortest boiler offered. CU's field tests have shown that the shortest rectangular cast-iron models invariably waste fuel.

In buying a round model, avoid type "A" shown in Figure 3. If it is possible to obtain it and fit it into your basement (there must be good headroom in the basement, or the boiler must be installed in a pit), buy a "seven-section" round cast-iron boiler. A degree less economical is the "six-section" round boiler, which has one less "pancake" than the other. Do *not* buy a round cast-iron boiler made up of only four or five sections.

STEEL BOILER CONSTRUCTION

Most steel boilers utilize the "fire-tube" construction (shown in Figure

4) in which the tubes or pipes are filled with hot gases. There is another type, seldom used for domestic heating but still featured by a few manufacturers, known as "water-tube" construction. In this type the flue tubes are filled with water and surrounded by hot gases from the fire. CU advises buyers to reject this type, as tubes are constantly springing leaks and needing replacement.

If you buy a good steel boiler of ample size you have the assurance of high efficiency. These standard models are excellent: *Fitzgibbons, Kewanee, Pacific, Spencer* and *Titusville.*

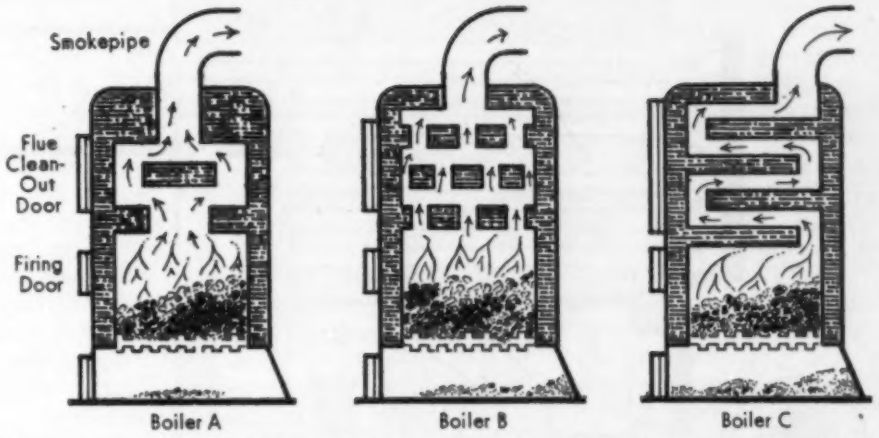


FIGURE 3.—*Round cast-iron boilers, with examples of three types of flue design. Boiler A is of the "up-and-out" design which permits much heat to be wasted to the smokepipe (the hot gases given off by the fire escape easily to the smokepipe through flue passages which are short and large). In Boiler B, the flue passages are efficient because they break up the hot gases into many small, lively streams and cause these to take tortuous paths to the smokepipe. In Boiler C the flue passages are efficient because the gases are broken up into flat, ribbon-like streams which work their way to the smokepipe through a long, zig-zag path.*

FUEL FLEXIBILITY

Fuel flexibility is desirable in a boiler, because you may wish to switch fuels in future years. A good-sized steel boiler which has been designed for coal and which can be fitted with grates for hand-firing is adaptable for any other fuel you may want to use — anthracite, coke, or bituminous coal, light or heavy fuel oil, anthracite or bituminous coal fired by a stoker, or artificial or manufactured gas.

ADDITIONAL POINTERS

Here are additional pointers on buying boilers:

1. JACKETED BOILERS: Buy a handsomely jacketed boiler only if you are willing to spend considerable money on looks. A jacket for a medium-size domestic boiler may cost from $30 to $40. In addition, many jacketed boilers are not well insulated, and the jackets interfere with the application of effective insulation.

2. BOILER INSULATION: "Insulating" a boiler by applying to it a half-inch thickness of ordinary asbestos cement is "Not Acceptable," according to CU standards. While ordinary asbestos cement is a heat-resisting material, it has relatively little insulating capacity. Good insulation may be obtained with a two-inch thickness of rock wool; or two-inch-thick slabs of "85% magnesia insulation." These slabs are wired to the boiler, then covered, for the sake of appearance, with a smooth layer of asbestos cement.

Steam boilers particularly should be well insulated. The heat in one and one-half tons of coal or about 200 gallons of fuel oil can be wasted yearly if a steam boiler lacks effective insulation. Waste through inadequate insulation of the boiler in a hot-water plant may amount to one-half to two-thirds this much fuel. And when boilers are used year-round for water heating, lack of insulation wastes a great deal more fuel. Unless they are intended to heat the basement in Winter, all steam and hot-water pipes in the basement should be well insulated further to conserve fuel.

3. HAVE YOUR HOUSE CHECKED CAREFULLY: Before buying a boiler for your home, make sure that the radiators are of ample size to heat every room properly; then make sure that the boiler has enough capacity for the radiation load.

4. ODD BOILER DESIGNS: Buy a boiler of standard construction which can be repaired by workmen who use standard methods. It may take three times as much time and work (and be three times as expensive) to make repairs or replacements in boilers of unusual design. In addition, with standard design, it is more likely that parts needed in 10 or 15 years will still be obtainable.

5. LOW-WATER PROTECTION: If you have a steam boiler, you should have some kind of protective device installed to prevent damage from operation without sufficient water. "Low water"—or worse, "no water" — can ruin a steam boiler. Most steam boilers in use today are not so protected.

6. SIZE OF STEAM BOILERS: One oddity in the case of steam boilers, which does not apply equally to hot-water boilers, is that they can be *too big* for fuel economy, especially when fired automatically by gas, stoker or oil burner. The steam boiler which is too small wastes fuel, of course. But the steam boiler which is altogether too large also wastes fuel, for it is slow to give heat after the fire has been started; in addition, the greatly oversized boiler gives off too much heat to the basement, and its excess of internal heating surface is detrimental to fuel economy. Buy a steam boiler which is somewhat oversized for the average heating load, but not one which is large enough for a house three times the size of yours.

7. "WET-BOTTOM BOILERS": CU's experts find that boilers of so-called "wet-bottom" or "Scotch" or "Scotch Marine" design are not, as is commonly supposed, actually more economical than good, standard "dry-bottom" boilers. And with oil firing, the wet-bottom boilers tend to give noise and flame pulsation trouble, because many boilers of this type do not have as much combustion space as do the standard type boilers.

8. BOILERS WITH INTEGRAL OIL BURNERS should be avoided. In future years you may want to install a different type of oil burner in your boiler. Or you may want to burn a different fuel in it. Unless you are willing to throw out the entire boiler under

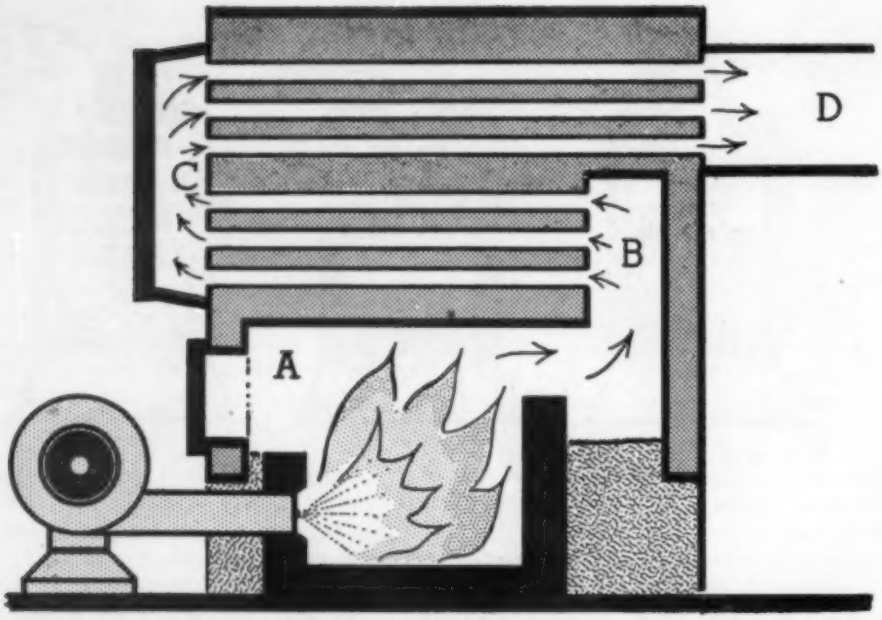


FIGURE 4.—*Typical steel boiler. Because of their superior flue design, the standard models of well-known makes of steel boilers give lower fuel bills than are given by ordinary cast-iron boilers. Here, the hot gases start at A, go past B and C, and wind up at smokepipe connection D. If you buy an efficient steel boiler fitted with grates, you have maximum flexibility in use of fuels, for such a burner can be handfired with any kind of solid fuel or automatically fired by coal stoker, oil burner or gas. (Boiler in drawing is fired by oil burner.)*

such circumstances, do not buy a combination oil burner and boiler, such as those featured by Gar Wood, General Electric, Delco and Timken. With an excellent oil burner and an excellent boiler, you will have fuel bills certainly as low as, and possibly lower than, you would get from a boiler with a built-in oil burner. (In addition, the special oil-boilers are generally of the odd, "tricky" design which should be avoided for reasons given above.)

9. STACK TEMPERATURE GUARANTEE: When you buy a boiler for oil firing, obtain a written guarantee that the stack temperature will not exceed 500° F. A contractor who says he is not certain the boiler will pass this 500° stack temperature test simply is not certain that he is selling you an efficient boiler. If your local contractor cannot give you this guarantee, write to the manufacturer. After you obtain the guarantee, have the equipment checked to make sure it performs accordingly. (Your fuel oil supplier may make the check-up at no charge, or arrange to have it made at a small charge. If not, you may have to call in a combustion expert or a heating engineer.)

10. WATER HEATING: Consider your problem of supplying hot running water when you buy a new boiler, for often it is well to have the boiler help in heating the water too. This applies especially if your boiler will be fired by a stoker or oil burner, for in that case it can provide year-round hot water at very low cost. CU's experts consider "tank type" indirect water heaters superior to the "tankless type," and advise the installation of a hot water tank even though you may be buying a new boiler which can be had with "tankless coils."

11. MAGAZINE-FEED BOILERS: For large numbers of home owners, magazine-feed boilers are the happy medium between hand-firing and the automatic stoker or oil burner. Because of their efficient design and because they use small, inexpensive sizes of anthracite coal, these boilers give appreciably lower fuel costs than ordinary flat-grate boilers. And they have two money-saving advantages over stokers and oil-burners: (1) there is no electric motor, which may mean an annual saving in electricity amounting to the cost of almost two tons of coal; (2) periodic service, such as is required by the stoker or oil burner, is not needed. Another advantage of the magazine-feed boiler is its silence.

If the boiler is large enough, the magazine will need filling only two to four times a week in mildly cold weather, and no more than once a day at any time. An electric thermostat will make operation automatic except for filling the magazine and removing the ashes.

Magazine-feed furnaces and boilers are recommended chiefly for home owners using anthracite. If you burn bituminous coal, do not buy magazine equipment unless the dealer can demonstrate satisfactorily that it will give good results with the bituminous coal available in your locality.

WARM-AIR FURNACES

If you are contemplating a new warm-air furnace or warm-air heating system, don't fail to read the report, "Heating Your Home," in the September 1945 issue of the *Reports*. Pay particular attention to the discussion of gravity-circulation as compared with forced-circulation heating systems, and to the comments on the "air-conditioning features" of modern warm-air heating plants. Also read the foregoing instructions on buying boilers, for many of the points apply as well to warm-air furnaces.

Your main objective in buying a furnace, as in buying a boiler, is to obtain a thoroughly good plant, capable of heating your house well on minimum fuel. The problems also are essentially similar, and boil down to: securing a furnace of good, standard construction, either of steel or cast-iron; obtaining a furnace of ample capacity to heat the house; selecting an efficient flue design which will take a good deal of the heat from the flue gases before they reach the smokepipe, giving low stack temperature. For certain homes, forced-circulation blowers are necessary if hard-to-heat rooms are to be well heated; for other homes, forced-circulation may be a nice thing to have but not essential; for still others—including thousands which up to now have been well heated by gravity-circulation warm-air plants—it is best to continue with gravity-type heating.

With automatic firing by gas, coal stoker or oil burner, lower stack temperatures usually result with a warm-air furnace designed for or well adapted to forced circulation. If you install oil firing, don't fail to obtain from the seller a guarantee of 500° F. maximum stack temperature.

STEEL IS SUPERIOR: Steel furnaces, because of their gas-tight construction

and reduced tendency to develop leaks, have an advantage over cast-iron furnaces. This is not great enough, however, to make cast-iron furnaces "Not Acceptable"; the best cast-iron furnaces give far greater satisfaction than the poorer steel furnaces.

For medium- and larger-size homes, buy a good, efficient warm-air furnace of ample size. Then, have this furnace fired by a good stoker or oil burner if desired. If possible, obtain a furnace especially designed for automatic firing—but whether this is possible or not, make sure the flues are well designed and the furnace well constructed and of sufficient size. Avoid buying a furnace with a built-in, integral oil burner. For oil heating, a gun-type oil burner made of standard parts will give the best performance.

FOR SMALL HOMES

If your home is small and well insulated, a gun-type burner is not recommended, for it cannot give a small enough flame. A good heating unit in this case is a "power burner" capable of giving an exceedingly small flame, such as the Timken *Silent Automatic* or the Eureka Vacuum Cleaner Company's *Oil-O-Matic*.

One rung lower in oil heating performance, but still very good and much less expensive to install is a small warm-air furnace unit equipped with a built-in pot-type oil burner. Pot-type burners are sensitive to improper fuel oils, however; satisfactory performance is obtained only when relatively expensive kerosene or No. 1 fuel oil is burned. Pot-type burners also show a greater tendency to give smoke and soot than do "power burners" during mildly cold months, or when there is poor chimney draft, or when oil and air adjustments are not precisely what they should be. The man of the house may have to take an interest in the burner to keep it going properly and to keep down the expense of calling in a burner expert to make minor adjustments; and every month or two, someone will have to clean carbon and soot from the pot of the burner.

COAL STOKERS

In buying a coal stoker, it is important to exercise the same care in selecting a dealer as in buying an oil burner (see the *Reports*, October 1945). The technical, installation and servicing ability of the stoker dealer is not, however, quite the same life-and-death matter as it is in the case of an oil burner dealer.

The stoker, particularly the anthracite stoker, is more nearly a self-contained unit than is an oil burner. In fact, a mechanically-inclined owner may safely make minor adjustments and repairs himself, as the stoker, unlike the oil burner, does not react violently and is not hazardous when tinkered with. The waste factor also is less drastic; stoker coal bills run low in comparison to fuel oil bills, and less money is wasted by a poorly adjusted stoker than by a poorly adjusted oil burner.

For these reasons, although it is best to try to buy a stoker from a well informed and reputable dealer, wise stoker buyers can depend more on the reliability of the manufacturer and less on the dealer than can buyers of oil burners.

BITUMINOUS STOKERS

If you are buying a bituminous stoker, enlist the assistance of a qualified, reputable dealer. He should be honest enough to tell you whether or not your present plant is suited for stoker firing. He should be experienced enough to handle only stokers well suited to local coal—for bituminous stokers of a given make do not burn all types of bituminous coal equally well.

Your boiler or furnace should have sufficient combustion space to permit clean burning of the volatile gases if you want successful firing with a bituminous stoker. Unsatisfactory performance often results when the stoker is installed the easiest way—with its hearth at grate level, cutting down space. To raise or pit a boiler for installation of a stoker requires extensive work, and is apt to be an even more difficult job with a warm-air furnace; in many cases a new, specially designed boiler or furnace is necessary for best results.

A chimney that is clean, tight and large enough to give sufficient draft is essential; a good dealer will test a questionable chimney. Long flue travels and a good heating system are also indispensable for good performance.

Your stoker should be fit for heavy-duty continuous service; avoid under-powered models equipped with "competitive" short-life (intermittent service) motors. An electric-type "overload protector" that stops the motor when it tends to overheat or draw excess current for more than a certain number of seconds is decidedly advantageous. It is standard equipment on some high-grade stoker motors, and can be had as an "extra" for any motor. The use of fuses or "shear pins" does not eliminate the need for an overload protector.

The transmission, which must stand up during long years of hard service, should be sufficiently durable and rugged whether it is hydraulic, continuous automotive, or intermittent roller-clutch or ratchet type. Adequate lubrication should be provided, and three or four feed rates are desirable.

An automatic air regulator, or some type of control to fit the air rate to the coal feed rate is highly desirable. Automatic, swinging-disc type draft regulators for the smoke-pipe, regularly supplied by some dealers, are good.

ANTHRACITE STOKERS

Since anthracite stokers do not require dealer-installed hearths, their burning efficiency is more readily controlled by the manufacturer. They

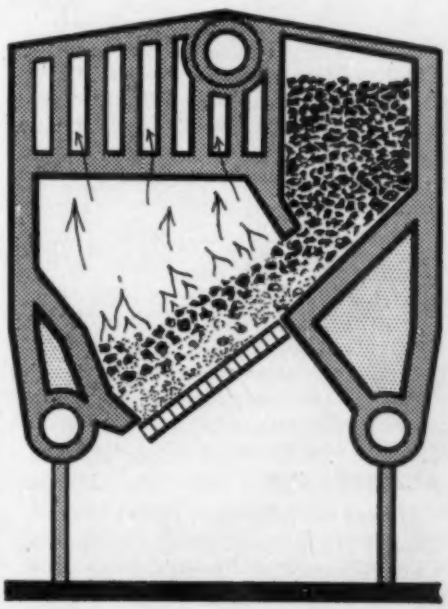


FIGURE 5—*Magazine-feed boiler. Excellent for thousands of home owners determined to keep down fuel costs. It needs little attention, is especially adaptable to automatic control by a room thermostat, burns small, inexpensive sizes of coal, and on typical installations is found to give surprisingly high efficiency.*

require less combustion space and so can be installed in many boilers and furnaces not suited to bituminous coal.

To get the very best in an anthracite stoker, try to get one of the old *Electric Furnace-Man* models which contain the very desirable "revolving retort" feature (which causes fine coal particles to be distributed evenly throughout the fuel bed, counteracting the tendency to pile up in the back). New lower-priced models brought out by the same company lack this feature and should be avoided. Those who find the old *Electric Furnace-Man* too high-priced should consider one of the other "Acceptable" stokers, which may cost from $50 to $150 less.

Hand-Fired Boilers

BEST BUYS

(Listed in alphabetical order, but note comments)

Burnham (Burnham Boiler Corp., Irvington, N. Y.). Typical cast-iron boilers; fairly priced and efficient when sized properly to match heating loads.

Fitzgibbons (Fitzgibbons Boiler Co., NYC). Steel boilers only.

National (National Radiator Corp., Johnston, Penna.). Typical cast-iron boilers. Buyers should make certain of obtaining a boiler large enough for the heating load.

H. B. Smith and **Mills** (H. B. Smith Co., Westfield, Mass.). Smallest models typical cast-iron boilers capable of good fuel economy when oversize for heating loads; medium-size and larger models especially well engineered and give outstandingly low coal bills; have "watertube" type flues.

Thatcher (Thatcher Furnace Co., Newark). Typical cast-iron boilers.

Weil McLain (Weil McLain Co., Chicago). Six-section and seven-section round cast-iron heating boilers especially efficient; other cast-iron boilers in this line typical of good practice.

ACCEPTABLE

(Listed in alphabetical order)

Capitol (U. S. Radiator Corp., Detroit).

Crane (Crane Co., Chicago).

Kewanee Type R (American Radiator & Standard Sanitary Corp., NYC).

Kohler (Kohler Co., Kohler, Wisc.).

No. 7 Ideal Boiler (American Radiator & Standard Sanitary Corp.). Performance superior to ordinary cast-iron boilers when oversize for load. Well-built, with several desirable modern features such as built-in water heating coils and large upper nipple for circulation between sections of steam boilers. CU field check-ups showed that some contractors install this boiler in sizes too small for fuel economy; purchasers should beware of this.

Pierce (Pierce Butler Radiator Corp., NYC).

Richmond (Richmond Radiator Corp., Detroit).

Spencer (Spencer Heater Co., NYC).

NOT ACCEPTABLE

Ideal Redflash (American Radiator & Sanitary Corp.). Poor flue travel design; apparently often installed undersized, for reasons related to the manufacturer's policies.

Boilers for Oil-Firing and Stoker-Firing

The companies listed above offer special models for stoker-firing and oil-firing. All of these are "Acceptable" when sold with the 500° F. maximum stack temperature guarantee.

ACCEPTABLE

The following, listed in alphabetical order, are good steel models:

Fitzgibbons (Fitzgibbons Boiler Co.).

Kewanee (American Radiator & Sanitary Corp.).

Pacific (Pacific Steel Boiler Division, U. S. Radiator Corp., Detroit).

Titusville (Titusville Iron Works, NYC).

Spencer (Spencer Heater Co.).

No. 6 Ideal Boiler (American Radiator & Standard Sanitary Corp.). Buy with or without the **Arcoflame** burner made by the same manufacturer. The larger of the two models offered, S-65-OB (steam) and W-65-OB (water) gave excellent results in CU field tests. Outstanding in many respects, including fuel efficiency. (Avoid installing the small model of this line, as it performs inefficiently in even the smallest homes. It is actually too small for the smallest flames which can be given by the pressure type oil burners for which this boiler is built.)

Boilers with Integral Oil Burners

For reasons given in this report, it is generally not advisable to buy a boiler with an integral oil burner. These are very special types of steel boilers, difficult and costly to repair. If, however, you insist on this type, consult the following ratings. Be sure to insist, if you buy, on a guarantee of 500° F. maximum stack temperature.

ACCEPTABLE

(In alphabetical order)

Delco-Heat Boiler (Delco Appliance Corp., Rochester, N. Y.).

Gar Wood (Gar Wood Industries, Detroit).

Quiet May (May Oil Burner Corp., Baltimore).

Timken (Timken Silent Automatic Co., Detroit).

NOT ACCEPTABLE

General Electric Oil Furnace (General Electric Co.). The design principles differ from those in other boiler-burner units, but the much-heralded efficiency has failed, in too many cases, to live up to claims. The boiler is almost impossible to clean, and it does get dirty despite the claim that combustion is so perfect that no cleaning is required. It is most efficient when used with a hot-water heating system, but when used as a steam boiler its efficiency (particularly at near maximum rated load) is low. Field tests by CU showed stack temperatures of 775° to 900° F.

Warm-Air Furnaces

See October 1945 issue of the Reports for tentative ratings of furnaces equipped with integral pot-type oil burners.

Anthracite Stokers

Good installation and servicing are more important than brand. Other makes not mentioned here should be considered if they can be purchased from a reputable dealer.

BEST BUY

Electric Furnace-Man (Electric Furnace-Man, Inc., NYC). *Note: Only the older models equipped with revolving retorts are rated "Best Buys."* This feature gives even-burning, efficient firebed. Ashes removed automatically from wind-box. Special blower wheel for proper air pressure. "Ash-wipers" which remove crusts of ashes from the edge of the retort. Rugged ash-removal system of chain-and-bucket type.

ACCEPTABLE

Listed in alphabetical order. Note comments.

Anchor Kolstoker (Anchor Stove & Range Co., New Albany, Ind.).

D & E (Dickson & Eddy, NYC). Well engineered and sturdy. Where offered by a good dealer, this is generally a "Best Buy" for home-owners who desire a good stoker at rock-bottom prices.

Electric Furnace-Man (Electric Furnace-man, Inc.). Newer models lacking the revolving retort feature described above as a "Best Buy" but retaining other good features are considered "Acceptable."

Fairbanks-Morse (Fairbanks-Morse & Co., Chicago). High grade equipment for home owners who can afford to pay higher than minimum prices. Revolving retort models are especially

efficient; don't buy the stationary retort models.

Iron Fireman (Iron Fireman Mfg. Co., Cleveland). Anthracite models are good, but not up to the excellence of **Iron Fireman** bituminous stokers.

Motorstoker (Hershey Machine & Foundry Co., Mannheim, Penna.).

Stokol (Stokol Stoker Co., Indianapolis). Heavy construction; mechanical parts exceptionally well engineered; combustion equal but not superior to that of models selling at somewhat lower prices.

Bituminous Stokers

ACCEPTABLE

The following six stokers (in alphabetical order) were exceptionally well constructed. When offered by reputable local dealers they should be given preference.

Anchor Kolstoker (Anchor Stove & Range Co.).

Econocol (Cotta Transmission Corp., Rockford, Ill.).

H & H (Holcomb & Hoke Mfg. Co., Indianapolis).

Iron Fireman (Iron Fireman Mfg. Co.).

Stokol (Stokol Stoker Co.). Superior combustion characteristics for certain coals which are difficult to burn in domestic plants. Especially rugged and trouble-free transmission.

Whiting (Whiting Corp., Harvey, Ill.). Capable of excellent combustion.

The following stokers (in alphabetical order) were found to be of good average construction and capable of excellent performance when installed and serviced properly, in plants suited to stoker firing.

Auburn (Auburn Foundry, Inc., Auburn, Ind.).

Combustioneer (Steel Products Co., Springfield, Ohio).

Conco (Conco-Sampsel Corp., Belleville, Ill.).

Eddy (Eddy Stoker Corp., Chicago).

Fairbanks-Morse (Fairbanks-Morse & Co.).

Freeman (Illinois Iron & Bolt Co., Carpentersville, Ill.).

Gehl (Gehl Bros. Mfg. Co., West Bend, Wisc.).

Kol-Master (Kol-Master Corp., Oregon, Ill.).

Link Belt (Link Belt Co., Chicago).

Master (Muncie Gear Works, Inc., Muncie, Ind.).

Original Pocahontas (Pocahontas Fuel Co., Cleveland). According to CU's data, this is the only bituminous stoker which offers automatic ash or clinker removal.

Plymouth (Plymouth Industries, Inc., Plymouth, Ind.).

Tru-Temp (Sinker Davis Co., Indianapolis).

Will-Burt (The Will-Burt Co., Orrville, Ohio).

Winkler (Winkler Mfg. Corp., Lebanon, Ind.).

HEALTH AND MEDICINE

HAROLD AARON, M. D., SPECIAL MEDICAL ADVISER

MEDICAL CONSULTANTS: **Dr. Anton J. Carlson**—Chairman, Dep't of Physiology, University of Chicago; Past President, American Physiological Society; **Dr. Theodor Rosebury**—Assistant Professor of Bacteriology, College of Physicians & Surgeons, and School of Dental and Oral Surgery, Columbia University; **Dr. Marion B. Sulzberger**—Ass't Professor of Clinical Dermatology and Syphilology, New York Post-Graduate Medical School, Columbia University; Editor, Journal of Investigative Dermatology.

CU's Medical Consultants give technical advice on matters of medicine which lie within their fields. CU is responsible for all opinions concerning social, economic and public health questions.

Fluorine and Tooth Decay

Dr. Maxwell Karshan discusses the situation and describes a large-scale experiment to determine the possibility of mass inhibition of dental caries by the addition of fluorine to water

The present interest in fluorine in relation to the teeth dates back to about 1908, when the mass occurrence of a characteristic dental defect known as mottled enamel was observed in the inhabitants of the town of Colorado Springs. Examination showed that about 80% of those who were born and raised in the community were afflicted to some degree. However, those who came to the locality after their teeth had been completely calcified did not acquire mottled teeth after residence there.

WATER SUPPLY HOLDS KEY

Colorado Springs received its water supply from the Pike's Peak watershed; the nearest community free from mottled enamel had a different source of water supply. Subsequent surveys in various parts of the United States confirmed the suspicion that the cause of the tooth defect was to be found in the water supply of the community.

An interesting development came to light in the small community of Oakley, Idaho. Here it was found that the teeth of the children began to show disfigurement after the installation of a new water supply system. When this was realized, water from a different spring was turned into the Oakley pipes. Eight years later, examination of the teeth of children born since the second change in water source showed complete absence of the previously-observed tooth lesions.

There was a similar occurrence in Bauxite, Arkansas, where, after the characteristic enamel defect had been observed, a new source of water was substituted. Examinations of teeth ten years after the water-supply change showed that there had been no further production of the enamel defect since that time. However, a rather startling fact was disclosed. The teeth which had calcified normally following the change in water supply showed a higher incidence of decay than was found in the teeth with mottled enamel.

Analyses of the water in the various communities where mottled enamel had been found showed that all the samples contained a common ingredient, fluorine; and that a fluorine compound was the responsible agent. In Oakley, for example, it was found that the water which had been used at the time of the occurrence of mottled enamel contained eight parts of fluoride, a fluorine compound, in every million parts of water (8 ppm). At Bauxite, the fluoride content of the water was 13 to 14 ppm before the water supply was changed. Since a fluorine compound (a fluoride) is responsible for the mottled

enamel, the condition is often referred to as enamel fluorosis.

Susceptibility to enamel fluorosis is sharply limited to children in whom the crowns of the permanent teeth are not yet completely calcified. Such calcification is completed, except for the third molar, during the first eight years of life.

Teeth affected by enamel fluorosis are characterized by chalky white patches distributed over their surfaces. In extreme cases, the enamel is pitted and corroded. The normal translucency is absent, and the mottled portions show an unglazed appearance. The imperfectly calcified mottled portions are more permeable than is normal enamel, consequently they tend to acquire a brown stain.

DEGREE VARIES WITH CONTENT

When the fluorine content of the water supply is around 1 ppm, only about 10% of the children appear to become affected, and these with a very mild mottling. In most cases the mottling is so mild as to be difficult to detect.

With the fluorine concentration at 2 ppm, mild mottling and even some pitting occur in the enamel of about 50% of the children exposed. At a fluorine level of 5 ppm or more, considerable mottling occurs in approximately 90% of the children exposed to such water from birth.

The fluorine content of the enamel of mottled teeth is double to treble that of normal teeth; the fluorine in the dentine (the part of the tooth which is covered by enamel in the crown) is likewise increased when fluorine-containing water is used during infancy and early childhood.

EFFECT ON TOOTH DECAY

The observation made at Bauxite, that teeth with mottled enamel had less decay than non-fluorosed teeth, has stimulated considerable research on the relationship of fluorine to dental caries. One of the earliest studies was at the towns of Galesburg and Quincy, Illinois. It was found that at Galesburg, where the water supply contained 1.8 ppm fluorine, there was only about one-third as much dental decay as in a comparable group of children in Quincy, where the water was practically fluorine-free. About half the children who had spent their lives at Galesburg showed a mild dental fluorosis, while no visible evidence of the condition could be found in the other half.

Subsequent studies involving over 7000 school children 12 to 14 years of age, conducted in 21 cities of four States, confirmed this finding of the relationship of fluoride in water to dental decay. Striking data were also disclosed in the relationship of the incidence of dental decay to the amount of fluoride present in the water. Children ingesting water which contained as little as 1 ppm fluorine had only about half as much tooth decay as comparable groups using water which contained no fluoride.

In 647 children continuously using water with over 1.4 ppm fluorine content, there was an average of 2.4 decayed, missing or filled teeth per child. Where the water supply contained from 1 ppm to 1.4 ppm of fluorine, a group of 1403 children averaged 2.9 affected teeth each. Where the fluorine concentration in the water supply was 0.5 ppm to 0.9 ppm, 1140 children had an average of 4.2 affected teeth. And 3867 children in cities where the water supplies contained less than 0.5 ppm fluorine had an average of 7.4 decayed, missing or filled teeth per child.

The inference, supported by other studies conducted in England, South Africa and India, is clear: up to a point, at least, an increase in the amount of fluoride in the drinking water decreases the amount of dental decay.

On the basis of this evidence, several cities, including Newburgh, N. Y., Grand Rapids, Mich. and Brandford, Ontario have increased the fluorine content of their water to about 1 ppm, in an attempt to reduce dental decay. Marshall, Texas, is also in the process of increasing the fluoride content of its water supply. The U. S. Public Health Service has specified 1 ppm of fluorine as the maximum permissible in drinking water; it should be recalled that at this concentration mottled enamel is produced in only a small fraction of the children, and that when it does occur, the condition is very mild.

THE NEWBURGH EXPERIMENT

A controlled experiment to demonstrate conclusively the effect of small amounts of fluorine in drinking water is being carried out in the neighboring cities of Newburgh and Kingston, under the auspices of the New York State Department of Health. Each of these is a city of about 30,000 population, with comparable water supply, climatic condition and population group; they have common sources of food supply. The plan—to be continued for a ten to twelve year period—involves treatment of the Newburgh water supply with a fluoride, to keep the fluorine content continuously at a level of 0.9 to 1 ppm. Kingston, where the water is to remain fluoride-free, is to serve as a control.

All children five to twelve years of age in both cities will have their teeth examined annually; additional physical examinations will be made to determine whether the fluorine has any effect on the growth and well-being of the children. Examination will include X-ray studies of the bones and the centers of ossification, blood and urine analyses. To see whether the fluoride-containing water has any effect on adults, a group of adults over fifty years of age will also be given complete physical examinations at regular intervals.

In the latter connection, it is interesting to note that recent examination of the teeth of 2026 servicemen having mottled enamel disclosed that the men who had lived in high-fluoride areas only up to the age of eight exhibited more dental decay than those

For the past several decades, dental and medical journals—and to a lesser degree, lay periodicals—have been concerned with the problem of fluorine in drinking water and its effect on the teeth. In this period it has become increasingly obvious that, while large amounts of fluorine in the water are detrimental to tooth calcification, producing a condition known as mottled enamel, smaller amounts appear to create a resistance to dental caries.

But, while this conclusion appears obvious from scattered data so far available, it remains to be confirmed or disproved by the large-scale, long-term experiment now being carried on in two cities in New York State.

Dr. Maxwell Karshan, Associate Professor of Biochemistry at the College of Physicians and Surgeons of Columbia University, describes the experiment in this article and discusses the history and background of the whole problem of fluorine and its effect on the teeth.

who continued to live in these areas up to adulthood. This suggests that fluoride may have an inhibitory effect on dental caries even after calcification of the permanent teeth.

DIRECT APPLICATION

A number of studies have been carried out to determine whether topical application (application directly to the teeth) of concentrated fluoride solution would have any effect on the susceptibility to dental caries. This study was prompted by an earlier finding: that mottled enamel has a higher fluoride content than normal enamel, and that teeth having mottled enamel are more resistant to decay than are normal teeth. Other experiments have shown that enamel separated from extracted teeth can acquire additional fluorine by direct contact with fluoride solution. Furthermore, enamel which has been treated in this way is up to 30% less soluble in acids than is the enamel from untreated teeth. This is important in view of the fact that in the process of tooth decay, the enamel (and later the dentine) is dissolved by acids which form as a result of carbohydrate decomposition. And finally, there is some evidence which suggests that enamel from sound teeth contains somewhat more fluorine than does sound enamel from carious teeth.

In the experiments on topical fluoride application, the solutions used have varied in fluoride concentration from 0.1% to 2% (approximately 1000 to 20,000 ppm), and the number of applications made by different investigators has varied from 15 in an eight-week period to one a year. In all cases, the solutions were applied for a few minutes at a time, with precautions taken against swallowing the solutions. In the experiments made so far, the age range of the subjects has been four to 19 years.

The findings so far are inconclusive. Several reports indicate a 25% to 50% reduction in caries as a result of topical application. Some reports have been negative. But on the whole, the evidence in favor of topical fluoride application has outweighed the evidence against. However, it is clear that additional investigation is needed before such use of fluorine is suggested for general use by the dental profession.

It should be noted that, should topical application be found successful, it might have the advantage of enriching the tooth enamel with fluorine without causing any mottling.

ANIMAL AND BACTERIOLOGICAL EXPERIMENTS

Additional weight has been given to the fluorine hypothesis by findings in certain animal and bacteriological experiments. Adult female rats, in one experiment, were fed a diet which included up to 40 ppm of fluorine, with a control group receiving no added fluoride. The offspring of both groups, after they had been weaned, were placed on a low-fluoride, caries-producing diet. It was found that the offspring of the rats which had been on a high-fluoride diet showed significantly fewer caries than the offspring of the control group. Since both groups of offspring received identical diets, the data indicates that the resistance to caries resided within the animals, as a result of the diet of the mother. Other experiments with rats show greatly reduced incidence of caries when high levels of fluorine are included in a caries-producing diet.

In the bacteriological field, there is evidence which suggests that the activity of acid-producing organisms isolated from the mouth are definitely reduced in the presence of small amounts of fluoride.

TOXICITY

Fluorides are protoplasmic poisons; they are used extensively to kill insects, and they are known to be fatal to man and other animals when ingested beyond certain limits. However, many substances which are poisonous in large amounts are highly beneficial in small doses. Chlorine, for example, is almost universally added to public water supplies, to make them safe. Iodide, also potentially poisonous, is added to water and to table salt in many areas to prevent goiter.

Fluoride intake, even below the fatal level, is also known to have toxic effects. For example, miners of cryolite (sodium aluminum fluoride) develop a condition known as osteosclerosis, characterized by abnormal density of the bones. It is of interest, in this connection, that children of mothers exposed to fluoride-containing dust near these mines frequently develop mottled enamel, even though they have not themselves been exposed. The fluoride presumably is transmitted to the children through the mother's milk.

In view of the toxic effects of excess fluoride, studies have been conducted to ascertain the amount that can be ingested daily with safety. The data show that between 19 and 25 years of age, the elimination of absorbed fluorine is practically complete when the quantities absorbed do not exceed 4 or 5 milligrams daily. When drinking water contains 1 ppm fluorine, and the solid food contains 0.1 to 1 ppm, the total daily intake is less than 2 milligrams, and therefore well below the level at which there is appreciable hazard of body storage.

FLUORIDE AS DENTAL DESENSITIZER

Dentists recently found that fluoride has the ability to desensitize dentine. This desensitizing effect lasts for many months, the exact period varying somewhat with different patients. Since exposure of dentine at the necks of the teeth, as a result of erosion or decay, is one of the common causes of toothache in adults, the proper use of this agent may result in the alleviation of much distress.

The most satisfactory results are said to be obtained from a paste consisting of one-third sodium fluoride, one-third white clay, and one-third glycerin. The paste has also been reported to be of value in relieving the pain of cavity preparation in sensitive areas. During either treatment proper precautions must, of course, be taken to prevent the patient from swallowing any of the paste.

USE IN DENTIFRICES

Regarding the desirability or the necessity of incorporating fluorides in dentifrices and mouthwashes or in foods or drugs for the control of dental caries, the Council on Dental Therapeutics of the American Dental Association made this statement in March 1945: "In the light of presently available information, the Council . . . is of the opinion that for the control of dental caries, the routine use by the dental profession or by the laity of foods, drugs, mouthwashes, dentifrices and other preparations in which fluorine occurs naturally or to which fluorides have been added is not justified because of their unestablished value and the known potential deleterious effects from the systemic absorption of fluorides. The Council will continue to evaluate new data as they become available."

LIFE INSURANCE

. . . a discussion of types

This is the third in a series of articles on insurance by E. A. Gilbert. The first two, dealing with GI insurance, appeared in the August and October 1945 issues of the REPORTS. *In this article, Mr. Gilbert turns his attention to the problems of consumers in general who are planning an insurance program for themselves and their dependents. This month he discusses two types of life insurance contracts: term insurance and combination savings-protection policies.*

Today, with taxes high and living costs rising, drastic personal economies have become a matter of immediate urgency for many families. Elimination of waste in existing insurance estates or in new policies may mean a substantial saving. An understanding of the practical workings of life insurance, the nature of various types of policies and the conditions under which they can best be adapted to individual needs can help the policy holder secure maximum protection at minimum cost.

Insurance companies offer the prospective buyer an almost endless and bewildering variety of contracts, ranging in price from $10 to $800 per thousand dollars of face amount. Claims made for these contracts include — more or less — protection for dependents in the event of the premature death of the insured; systematic savings programs guaranteeing high yields; investment opportunities of unparalleled safety; repayment of mortgages; estate conservation through reduction of estate taxes; income in the event of accident or disability; education of children; a retirement income for every member of the family; and even reduction of income tax. And this doesn't even begin to exhaust the list!

To bring order out of this confusing picture, we can begin by analyzing the types of problems which consumers face when planning an insurance program. They fall, we find, into three basic categories:

- **Protection** for our dependents in the event of premature death.
- **Savings** for future contingencies such as sickness, accidents, unemployment, business reverses, etc.
- **Income** for eventual retirement.

And we find, examining further, that there are three basic types of contracts offered to meet these needs:

- **Insurance** policies, for protection against premature death.
- **Endowment** policies, for systematic savings.
- **Annuities,** for later retirement.

If these three programs were kept independent of each other, set down in separate contracts, there would be little cause for confusion and error. But because they are usually offered in varying combinations, consumers frequently fail to recognize the essential character and purpose of different contracts and often, therefore, fail to solve problems satisfactorily.

In this article we shall take up problem number one: protection of dependents against premature death by life insurance. The label placed on a "life insurance" contract and the claims made for it notwithstanding, the contract will prove to be either a pure protection (term insurance) policy or one which combines savings (endowment) with protection.

For the purpose of financial security at the time of death, term insurance offers maximum protection at minimum cost. Regardless of any of the high pressure sales talk you may hear from insurance salesmen, any life insurance policy which includes savings reduces the risk carried by the company while increasing the cost to the policyholder.

COMBINATION CONTRACTS

The full practical implications of combining savings with protection can be seen by studying the operation of a straight endowment contract.

The essential principle of an endowment policy is the progressive reduction of the company's risk by the accumulation of cash. (This is graphically illustrated in the accompanying table.) From the moment the contract is consummated, the policyholder begins the process of reducing the company's risk, and by the time the policy matures the risk has been reduced to zero. The policy matures or endows when the cash accumulated equals the face value of the contract, and the accumulated savings are then returned to the policyholder.

Variations in the titles given different contracts are determined by the length of time it takes for the reserve or cash value to equal the face amount of the policy. In a 20-year endowment, as the title implies, it takes 20 years for the savings element to equal the face amount. If it requires 30 years, by virtue of smaller annual payments, it would be a 30-year endowment. Even the so-called ordinary life policy is an endowment—maturing when the policyholder reaches the age of 96. If the policyholder is still alive at this time, he collects the full amount of the contract. A more accurate description of the ordinary life policy, therefore, would be "endowment at 96."

The net premium of a combination savings-protection contract is determined by two factors: the rate of interest and mortality statistics. (Investment operations of insurance companies, which determine the former, will be discussed in a forthcoming article.) The higher the premium you pay initially, the greater the savings element in your contract, and

*Analysis of a 20-Year Endowment Policy at Age 35**

Year of Policy	Face Amount of Policy	Reserve (Self-Insurance)	Company's Risk (Insurance)
1	$1000	$ 32.86	$967.14
5	1000	178.18	821.82
10	1000	395.99	604.01
15	1000	664.10	335.90
20	1000	1000.00	0.00

* Note that at any time, the company's risk is not the face amount, but rather the difference between the face amount and the reserve or cash accumulation.

the smaller the element of protection or risk for the company. When you pay more than $10 per thousand at age 35, you are paying for more than pure protection. Additional payments for savings do not, however, increase the amount paid to the beneficiary, which is the face amount.

TERM INSURANCE

In the case of pure protection contracts, the savings element is eliminated, thus dismissing the factor of interest in computing cost. A pure protection policy, known as natural premium or term insurance, provides insurance protection and nothing more. Constant and permanent protection is secured at a rate that rises in accordance with rising mortality levels statistically determined for the entire range of age groups; the company carries all the risk at all times. There is no over-payment to create a cash reserve, and the company is not involved in any problem entailing the investment of funds at guaranteed interest rates.

Life insurance, like any other form of insurance, is a device to shift to the group or community the risk of individual loss. No one knows exactly or even approximately when he will die. But by consolidating a large number of risks and applying the science of statistics, the element of uncertainty can be reduced. Through the institution of insurance, a large number of people share the burdens which may suddenly fall upon a few of their number, thus offsetting personal loss by financial protection.

For the insurance company, there is no risk whatever. The companies are able to determine in advance and with complete certainty, based on mortality statistics, how many people of a particular age group are likely to die within the year, and can readily anticipate their mortality costs.

The premium charged the policyholder should equal his share of the death claims plus reasonable overhead expenses of the company—and no more. Obviously, if the premium charged for term insurance is based on the probability of death as indicated by a particular mortality table, that table becomes all-important in determining cost. A table which indicates a higher probability of death will correspondingly call for higher premiums for each thousand dollars of protection. Conversely, a table which indicates a lower mortality rate will provide the basis for correspondingly lower premiums.

Comparison of American Experience Table with American Men Ultimate Table of Mortality

Age	Death Rate Per 1000 AET	Death Rate Per 1000 AMUT
21	7.85	4.02
25	8.06	4.31
30	8.43	4.46
35	8.95	4.78
40	9.79	5.84
45	11.16	7.94
50	13.78	11.58
55	18.57	17.47
60	26.69	26.68
65	40.13	40.66

The table most widely used by insurance companies in this country is the American Experience Table of Mortality, compiled by Sheppard Homans in 1868 from the mortality experience of the Mutual Life Insurance Company of New York. But more than 75 years have elapsed since that experience—years marked by significant advances in medical science. And the average life expectancy of our population has been substantially increased. Current use of the 1868 table, ignoring the life-prolonging factors of X-ray, surgery, preventive and corrective medicine, improved hospitals and clinics, etc., presupposes a much higher death rate than that which actually prevails, and as a result premiums based on it are higher than they need be.

A number of companies have in recent years switched to more up-to-date tables which better approximate current mortality experience. Where this has been done, the more favorable life expectancy figures have resulted in lower insurance rates.

To appreciate the variation in cost resulting from the use of different mortality tables, we compare the obsolete American Experience Table of Mortality with the modern American Men Ultimate Table of Mortality. (See chart.) According to the American Experience Table, 8.95 persons out of every 1,000 at age 35 are expected to die each year. To insure these 1,000 people for $1,000 each would require a premium of $8.95 per person plus a reasonable amount for company overhead. Collecting 1,000 such premiums would create an insurance fund of $8,950—the sum needed to pay $1,000 on each of the deaths occurring during that year.

Where, however, the American Men Table is used, the expected death rate per 1,000 at age 35 is only 4.78—little more than half that of the American Experience Table—requiring a premium charge per person of only $4.78. Of course, the more favorable mortality rates of the early years must ultimately yield to a much higher ratio in the advanced age brackets.

National Service Life Insurance, which has many admirable features, inexcusably persists in the use of the outdated American Experience Table for computing premiums. Servicemen and women, therefore, who are entitled to insurance protection at actual net cost, are paying almost twice as much as they should.

This is not necessarily true, however, in the case of private insurance contracts. If mortality experience were the sole factor in determining the cost of private insurance contracts, we could categorically claim that any company using the American Men Table could sell cheaper contracts than companies using the old table. But in addition to the charge for actual mortality, there are acquisition and administrative expenses which vary considerably among companies. Consequently, because of high overhead expenses, some companies using the modern American Men Table charge more for contracts than companies using the old American Experience Table.

In one important respect, all mortality tables are alike: the probability of death increases with age. This necessitates a steadily increasing cost for insurance protection for the policyholder, regardless of the type of contract, corresponding to the table reading for the age attained. (In contracts other than term insurance, this increasing cost is taken into account in determining the "level premium.") The probability of death is fixed for each age group, and the increasing cost cannot be avoided by buying insurance early in life.

If permanent insurance is desired, natural premium or term insurance—providing protection which remains constant and never decreases, with all the risk carried at all times by the insurance company, and without additional payments for savings which do not increase the face amount paid to the beneficiary—is a "best buy" for the consumer. The reasons will be discussed in future articles.

Medical Care For All

The Wagner-Murray-Dingell Plan

By Dr. Ernst P. Boas

Far exceeding the casualties sustained by our armed forces in this war was the toll of our nation's youth taken by that other enemy axis, poverty and disease. Examinations made by Selective Service exposed the full extent of its ravages. Millions of young men were found to be suffering from ailments which were immediately remediable or which might have been checked in childhood.

This is a bitter fact for all of us to face. For centuries we have been fighting disease, winning victory after victory over the malignant forces of nature. In recent decades, especially, we have made tremendous strides in developing new laboratory techniques, in specialization and in the use of powerful beneficent drugs.

Yet the benefits of modern medical science are being withheld from millions of our population who cannot afford to pay for medical care. Their minor ailments become chronic; chronic degenerative diseases, cancer, heart trouble, diabetes and tuberculosis go undetected and unchecked until it is too late.

Many physicians and laymen have long been aware of the fact that a government program of universal medical care through health insurance could dispel this tragic contradiction. Today such a program is well on the way toward becoming reality, through our country's legislative process.

Senate Bill 1606, known also as the Wagner-Murray-Dingell bill, would provide medical care for every one of the 135,000,000 people in the United States, by setting up a program of expanded medical and research facilities and instituting compulsory health insurance.

The bill, which in complete form provides for considerable expansion of our whole social security system, places the problems of the nation's health in proper perspective. Its passage would, for the first time in our country's history, guarantee the right of every American citizen to the protection of medical science.

Under this bill, the social security tax would be increased to a flat four per cent on incomes up to $3,600, matched by a similar amount paid into the same fund by employers. (Three-fourths of the American people earn less than $3,600 annually.) Of the eight per cent, only three per cent, or three-eighths, would be earmarked for the medical program; the remainder is set aside for other forms of social security.

$54 A YEAR MAXIMUM

Thus, medical protection for the family of a worker earning $3,600 would cost him $54 a year. A worker earning $1,000 a year would be paying $15. Self-employed professionals, shopkeepers and executives would pay a slightly higher amount. This sum would guarantee not only ordinary medical care and hospitalization, but also care and treatment by specialists, X-rays, laboratory tests, operations, etc.

Medical bills for a family of four in the middle income brackets now average about $120 a year. In the low income groups, families pay a few dollars a year, getting little care. Every year, statistics show, some major illness costing hundreds of dollars plunges five per cent of these families deeply into debt. Under the terms of the bill, all will prepay a small proportionate amount of their income while they are well to insure themselves against future illness.

Payment would be universal, though there would be no compulsion to make use of the plan. Thus, Henry Ford, like everyone else, would pay his annual health insurance tax. He could, however, continue to consult his own physicians if he so desired. A Ford plant worker, on the other hand, earning $52.50 a week, and with a wife and child, would be thankful that he need no longer dip into his reserves when sickness or accident strikes.

If another child is expected, his regular social security payments would cover his wife's pre-natal care, laboratory tests, obstetrician's and pediatrician's fees, and post-natal care. Hospital bills up to $7 a day for a period of 30 days, and up to $4.50 daily thereafter up to 120 days would be paid by the government out of the health insurance fund.

In later years there would be other medical expenses: diphtheria, smallpox and typhoid vaccinations for the children; the common children's diseases; accidents; a special diet for a delicate child; eyeglasses; examinations and treatments by specialists that would otherwise have been too costly for their means.

Senate Bill 1606 also provides Federal grants to the States for the public health programs, maternal and child-health care, and medical care for the indigent. This would be a long overdue boon to the pellagra- and hookworm-ridden sharecroppers of the Deep South, and to the people of other rural areas which up to now have been without sanitary and health services.

It has been charged by opponents of the program that the quality of medical care would deteriorate under this set-up. Nothing could be further from the truth. Every doctor would have access to modern, costly equipment, specialists' and consultants' services, laboratory tests. Every patient would have equal access, regardless of financial means, to the best that medical science can offer.

Against outcries of "dictatorship," "bureaucracy" and "regimentation" stand these facts:

Lists of doctors agreeing to operate under the program would be posted by local health agencies, and their services would be available to the public. No doctor would be forced to place his name on the public list; no patient would be forced to consult an approved doctor. The patient wishing to take advantage of the benefits would be free to choose

About the Author . . .

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any doctor from the list of those participating in the plan.

Doctors would benefit from the plan too. Their incomes would be increased by payments from the general fund, either on a fee basis, by flat rate per capita or by salary, as they preferred.

The U. S. Surgeon General would administer the law in consultation with a National Advisory Medical Policy Council composed of medical men and public figures appointed upon the recommendation of leading medical authorities. Should the Council fail to agree with the Surgeon General on any phase of the program, it has the right to bring any and all issues to the attention of the public.

In the administration of the program, all that the national government (the Washington "bureaucrats") would do would be to collect the money and set up minimum standards to be followed by all doctors and hospitals. Existing health agencies and organizations of medical men within each State and local area would supervise the application of the law.

WHY THE GANG-UP?

Why, therefore, in the face of this objective demonstration of the program's value, has it met with such an unprecedented campaign of misrepresentation by such organizations as the American Medical Association, the American Bar Association and the American Hospital Association?

These organizations have succeeded with their propaganda in convincing some doctors, especially the high-priced specialists, that the health bill would enslave them to some vague bureaucracy. They fear that they would no longer be able to charge "as much as the traffic will bear." Others have been panicked by the AMA's red-scare propaganda labeling the bill "communistic" and "un-American."

Many millions of laymen have been similarly misled by the poison-pen attacks of such journalists as Paul Mallon, the late Benjamin de Casseres and others, whose opposition is not based upon specific criticism but is part of a general offensive against all progressive legislation.

A million-dollar war chest to fight the Wagner-Murray-Dingell bill has been raised by the National Physicians Committee, an outfit which is in reality fronting for the AMA. (The AMA *per se*, because it enjoys tax exemption as an educational and scientific institution, is barred from political action.)

An important clue to the forces behind the campaign is the fact that much of this money has come from great pharmaceutical corporations and manufacturers of surgical appliances. These interests see in the Wagner-Murray-Dingell bill a threat to the wide margin of profits they have been extracting from the public for their patent medicines and other drug products.

Although Senate Bill 1606 makes no mention of drugs, its passage would mean that the sick would not have to buy worthless patent medicines. With real medical care, sales of patent medicines for self-medication would be bound to decline sharply. Business for the pharmaceutical corporations would consequently fall off, hence their activity to defeat the bill.

But the American people know that the issue of the nation's health far outweighs considerations of commercial profit. As a nation we have learned the importance of good health for all our citizens, and we are realizing that we can no longer afford to leave this vital matter to chance and individual economic circumstance.

With the Wagner-Murray-Dingell bill, America now has its greatest opportunity to safeguard and improve the national health. The time has come to marshal the complete resources of modern medicine and place them at the service of all our people. It is for such a national health program that all of us—doctors and laymen—must work together. Our efforts are needed to transform this program into reality.

Our Part

Still buried in committees in both Houses, the Wagner-Murray-Dingell bill must be brought to the floor of Congress and to the attention of the American people. Strong pressure on Congressmen and Senators, without delay, is needed to build up the support the bill must have when it faces its fight for passage.

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Autos, Winter Care	7
Boilers, Heating	14
Cleaners, Window	11
Dyes, Fabric	9
Fluorine and Tooth Decay	21
Furnaces	14
Heating Equipment	14
Insurance, Life	24
Lipstick	4
Medical Care	26
Peaches, Canned	12
Radio, Emerson	2
Stokers	14
Teeth, Fluorine and Decay	21
Wagner-Murray-Dingell Bill	26
Window Cleaners	11

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